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CATALOGUE

OF THE

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

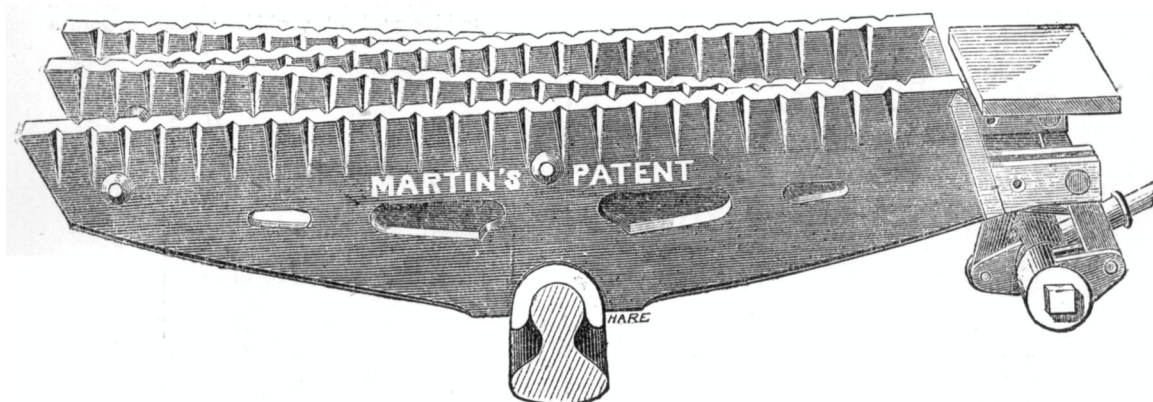
BEING A COLLECTION OF ARTICLES RECENTLY INVENTED, PATENTED, OR REGISTERED,
EXHIBITED AT THE SOCIETY OF ARTS, ADELPHI, DURING THE SPRING OF 1861.

N.B.—The Council wish it to be understood that they are not responsible for any of the statements contained in this Catalogue.

ENGINEERING, MINING, RAILWAY MECHANISM, &c.

(For the remainder of the Articles in this Section, see Drawings.)

1. Patent Rocking Fire Bars ; William Arena Martin, 55, Great Sutton-street, Clerkenwell, E.C.



These fire-bars have but one bearer, on which they rock, and which is situated in the centre or nearer one end, according to their length. Motion is given by link levers, threaded on a suitable-sized square bar, having a bearing at each end under the dead plate. One of the levers has a socket cast on it for the admission of a moveable or fixed handle, which gives motion to the whole series at once. A catch is fitted to the side lever, to retain them in a level position after the rocking movement has been performed. The holes in the bars are for keeping them cool, also for allowing expansion and contraction, and preserving them in a straight line. The grooves at the top edges are for grinding the clinkers and passing them through, thereby keeping the spaces clear for admitting streams of air, the back or bridge ends of the bars being entirely free, allowing currents of air by their free passage to ignite the gases, thus consuming smoke and giving intense heat.

The rocking movement entirely breaks up all clinkers, affording unusual facility for keeping fires clean with every variety of fuel and continual use.

2. Specimen of Patent Fuel ; Jabez Church, Gas Station, Upper Kennington-lane, S.E.

This fuel is manufactured from the breeze of gas works, mixed with asphalt or coal-tar pitch, slaked lime, and a sufficient quantity of coal tar to render it adhesive. It is then placed in a wrought iron scoop, which is to be put into a retort, such as is commonly used in gas works, and then submitted to the action of heat during five or six hours, when it forms a fuel for locomotive engines, as well as for other purposes requiring the use of coke fuel.

3. Patent Fire Feeder and Smokeless Furnace; William Yates, 7, Mary-street, Bromley, Middlesex, E.

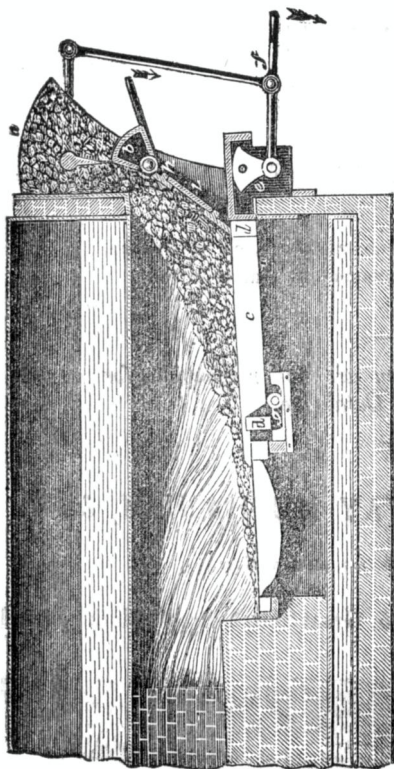


FIG. 1.

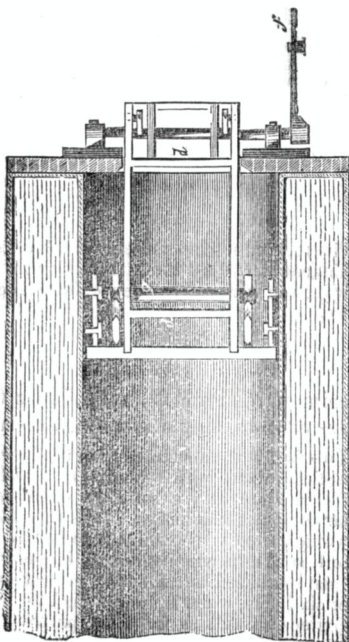


FIG. 2.

In the accompanying engravings Fig. 1 is a sectional elevation, and Fig. 2 a plan of the front part of the furnace. Above the mouth of the furnace is a hopper *a*, with a bottom *b* attached to a transverse shaft, and which may be moved by hand or otherwise, so as to open a free passage for fuel down into the furnace. Several

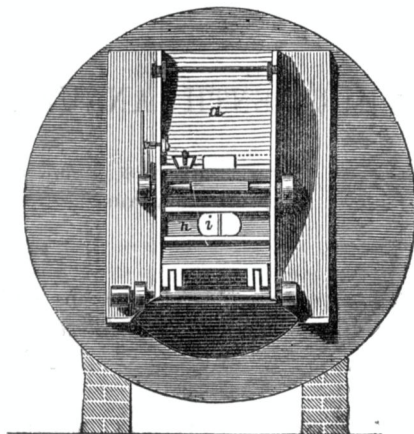


FIG. 3.

of the central firebars of the furnace *cc* are connected together by transverse bearers or frames *dd*, the outer ends of them (or those nearest the front of the furnace) being supported upon a rocking quadrant *e*, which is furnished with a

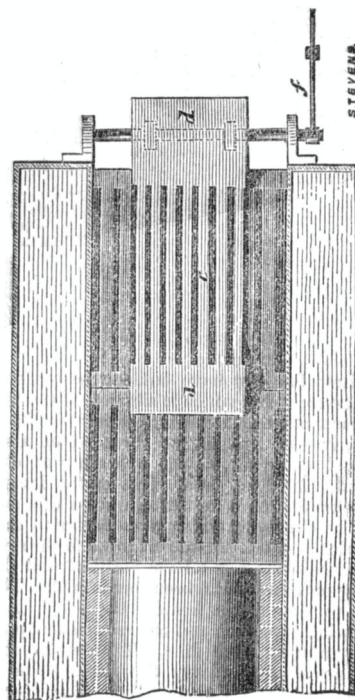


FIG. 4.

lever *f*, and the inner ends upon a roller *g*. Then, by means of a pin attached to the quadrant and

a slot in the front bearer or frame, or by any other suitable means, when the quadrant is turned about its axis in one direction, the fire-bars are drawn out from under the fuel, which is prevented from moving forward with them by the closed door of the furnace *h*, and when the quadrant is turned in the other direction the fuel is carried back into the furnace on the firebars, a fresh supply at the same time falling in behind it from the hopper. The door is kept shut during the ordinary working of the furnace, and is provided with a hole, shut by a slide *i*, through which hole the condition of the furnace may be watched, and the stoker's tools applied if necessary. Fig. 3 shows a plan of the furnace with some of the bars and other parts removed, and Fig. 4 is a front elevation of the furnace.

Wright's Improved Patent Moveable Fire Bars; Exhibited by J. Lester Clark, 2, Sambrook-court, Basinghall-street, E.C.

These fire-bars have a peculiar advancing and retiring action, which is produced by a lever in front of the dead plate. The slag that is formed at the extreme back of the furnace is thus brought with every successive action of the bars, and deposited on the dead-plate or mouth of the furnace: this is important, as the removal of slag from the extreme back of furnaces has always been attended with great difficulty and the periodical destruction of the fire, with the attendant evil consequences of a sudden rush of cold air to the boiler, which too often suddenly contracts the plates, and cracks them, or causes old flaws and defects to leak anew.

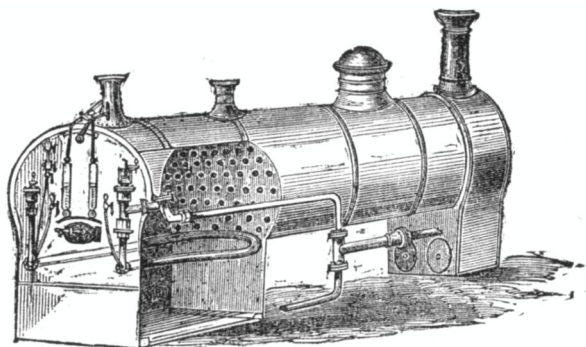
5. Patent Steam Boiler; J. Redfern, 33, Cumberland-road, Southsea.

This invention is designed for preventing the burning of the tubes of multitubular boilers, and also for presenting a considerably larger area of fire surface than usual, in proportion to the size of the boiler. The tubes are also more accessible for cleaning and repairing, as also the flues and other parts of the boiler. The peculiarity of the invention consists principally in constructing the boiler with a return flue at the sides or through the centre, thus compelling the heat to traverse from back to front of the boiler and then to enter the tubes at the front end of the boiler instead of the back, as usually arranged. By these means burning of the tubes and tube plate is prevented or materially lessened, the durability of the boiler increased and economy in fuel effected. Should it be necessary at any time to take out the tubes, they can be replaced without any new tubes being required, as shown in the drawing, fig. 3. The boiler takes up no more room, and has quite as much tube area, that which is taken from the sides being made up at the top; they can be made with doors either front or back, or with both, as local circumstances may admit, and any number of fire-boxes may be placed in one casing. (See drawing No. 238.)

6. Patent Feed-water Heating Apparatus and Safety Tube for Tubular Steam Generators; S. S. Bateson, 17, Bolton-street, Piccadilly, W.

This invention consists, first, in forcing the feed-

water through a tube or feed-coil, placed within the fire-box or furnace, and exposed to the action of the fire before it enters the boiler. Secondly in fitting such tube or feed-coil with an internal tube of smaller diameter in connexion at each end with the water space of the boiler, and perforated with small holes throughout that portion of its length which coincides with the surface of the external tube exposed to the direct action of the fire. Thirdly, in the application of valvu-



lar arrangements by which the feed-coil becomes a tubular appendage to or part of the boiler when the feed pump is not in action. Fourthly, in the application of the internal perforated tube to all steam generators composed wholly or partly of water-tubes, by which the tendency of the water therein to assume the spheroidal condition and the consequent burning and destruction of the tubes, are prevented.—(See *Practical Mechanics' Journal*. Dec. 1, 1860, p. 236.)

7. Patent Feed-Water Heater for Marine Steam-Boilers; Francis Davidson, 49, York-terrace, Everton, Liverpool.

This invention consists of mechanical arrangements for heating or raising the temperature of the water forced into or supplied to marine steam boilers, by the utilisation of the heat given off by, or through the "surface blow-off" pipe. The model shows the internal tube as the ordinary "surface blow-off," and the annular passage formed by jacketing it, or surrounding it, with a larger pipe, as the feed-water passage or space.

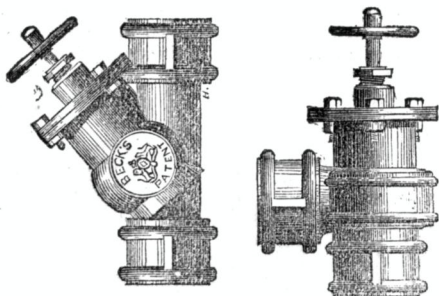
8. Safety-Pipe for Steam-Boilers; Samuel Terrill, Redruth, Cornwall.

This pipe is placed in the boiler, and fastened at the bottom by rivets. Two inches above the furnace, a lead ring is placed, forming part of the pipe. If the water should at any time be low, the lead will melt, and permit the steam to escape through the pipe at the top of the boiler. The lead being placed two inches above the furnace, will be prevented from corroding by any action upon it of sediment in the boiler.

9. Patent Stop-Valve for Hot Water and other Fluids; T. Beck, 10, Isabella-street, Collingwood-street, Blackfriars-road, S.

The peculiarity of these valves consists in the

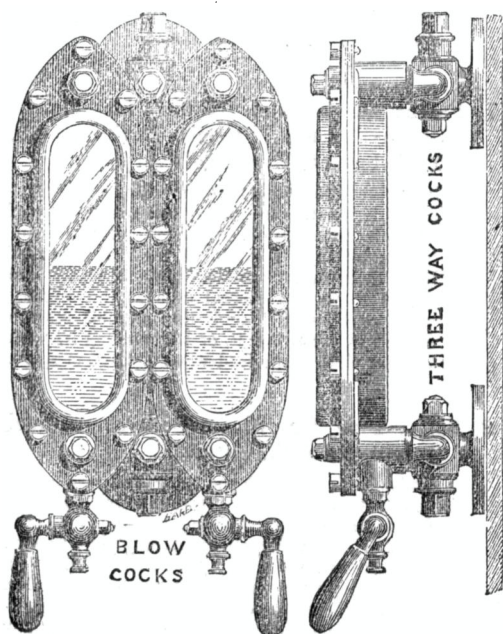
movement of the valve spindle, the screw of which is so arranged as to work in about one-fourth part of a female screw, which may be said to form a rack, thus much diminishing the liability to set fast.



10. Patent Flat Glass Water Gauges for Steam Boilers, &c. ; James Chandler, 35, Sutherland-street, Pimlico, S.W.

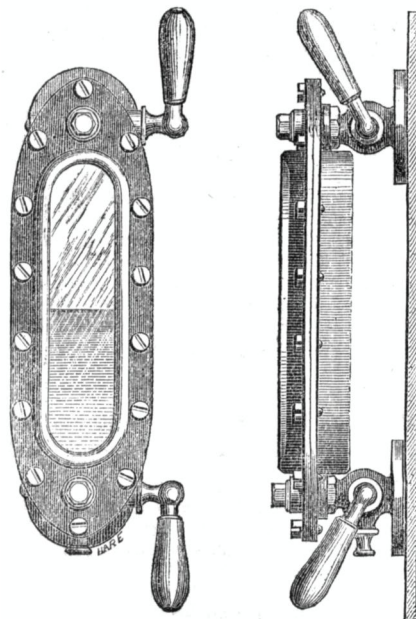
Double and Check Gauge, A.

The object of this gauge is, that the indication of one should check the indication of the other; and should either of them meet with injury the one injured can be shut off during repair and the other used as a duplicate.



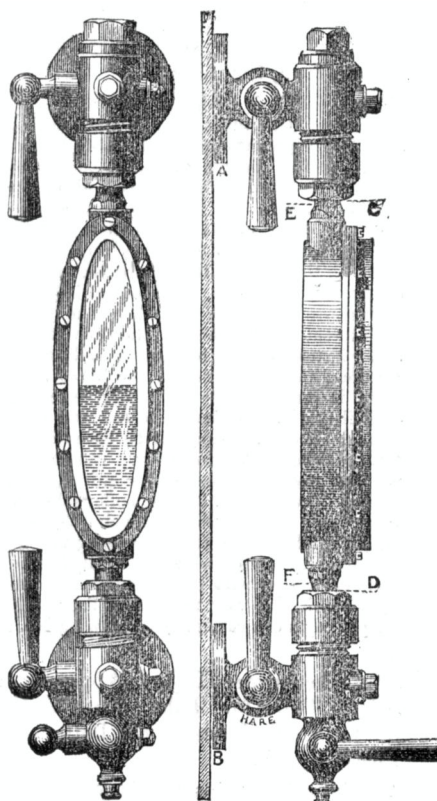
Single Gauge, B.

This gauge is single, but it is on the same principle as the gauge A. This gauge is intended as a substitute for the common glass tube for existing glass tube con-



Universal Gauge, C.

nections on old boilers, the object being to avoid the inconvenience of stoppages, &c., as this gauge can be attached to the old cocks as readily as renewing a glass tube.

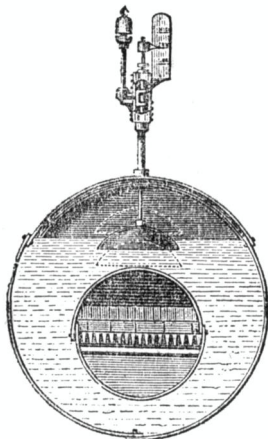


12. Patent Flat Glass Water Gauges; Pullan and Cresswell, Surrey Iron Works, 92, Blackfriars-road, S.

(See drawing, No. 230.)

Fig. A, Medwin's patent alarm whistle water gauge. The float is hollow, made of iron, and hung by a hollow rod passing freely up a pipe affixed to the slide and pointer, both of which it moves as the water rises and falls in the boiler, and opens the passage to the whistle, which

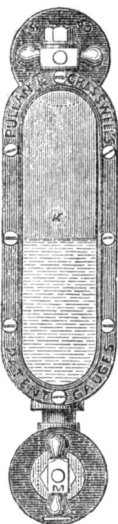
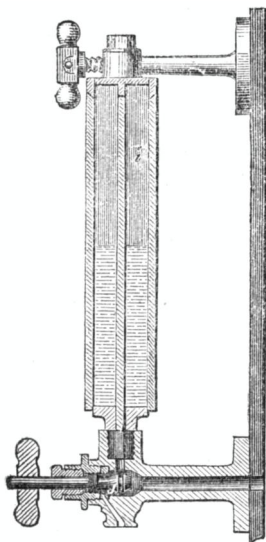
FIG. A.



blows loudly until attended to. Figs. 3 and 4 are a front elevation and sectional side view of the patent reflecting flat glass water gauge, with screw valves, top and bottom, for testing and shutting off all communication

FIG. 3.

FIG. 4.

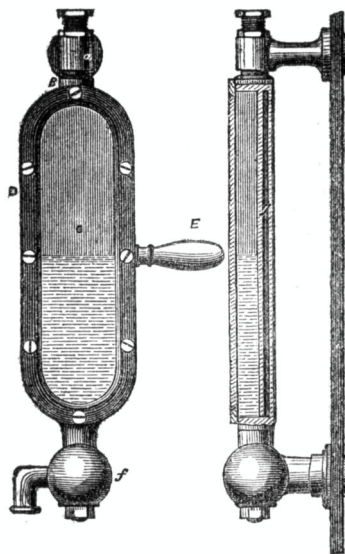


from the boiler. Figs. 1 and 2—Front elevation and sectional side view of the patent water gauge, with a reflector at the back to show the height of the water,

also an improved mode of shutting off all communication with the boiler by turning the

FIG. 1.

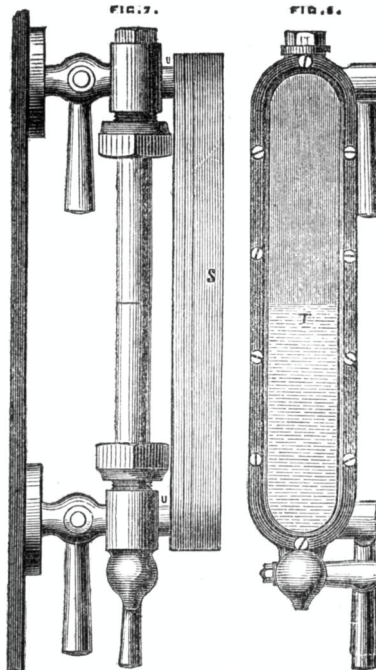
FIG. 2.



gauge by the handle, as shown at the side. Figs. 7 and 8 show one of the patent reflecting flat glass gauges affixed to an ordinary gauge on a boiler, by which a much longer range of water is obtained, and no fresh

FIG. 7.

FIG. 8.



holes required in the boiler. Figs. 5 and 6 show an arrangement for several gauges to be placed behind one another, so that, in case of accident

to the front glass, it can be removed by closing one of the valves top and bottom.

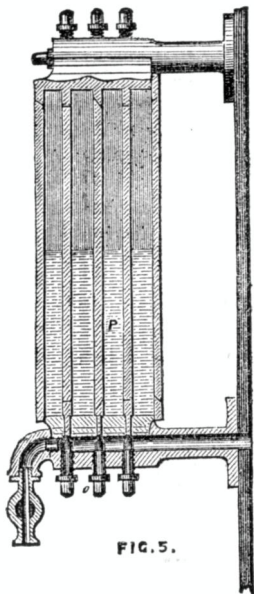


FIG. 5.

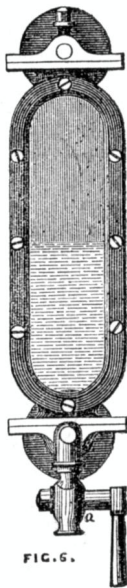
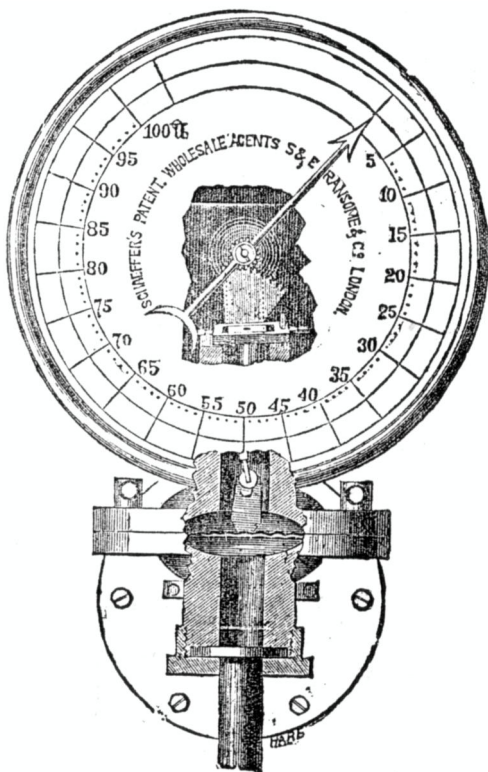


FIG. 6.

13. Schaeffer's Patent Improved Steam and Vacuum Gauge; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.



The action of this gauge is direct. The steam,

brought by a small tube from the boiler or main-pipe, presses on a corrugated metal plate, which is protected from corrosion by a plate of pure silver. The specimen gauge exhibited is a combination of pressure and vacuum upon one dial, thereby obviating the necessity of having two separate gauges.

14. Patent Steam Boiler and Superheating Apparatus; Pullan, Cresswell, and Longstaff.—Exhibited by Pullan and Cresswell, Surrey Iron Works, 92, Blackfriars-road, S.
15. Patent Improved Steam Engine Governor; William Leatham, Brookfield Works, Hunslet-lane, Leeds.
(See Drawing, No. 234.)
16. Patent Water Meter; Manchester Water Meter Company, Tipping-street, Ardwick, Manchester.

17. Sebill's Patent Water, Gas, and other Conduit Pipes.—Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

These pipes are manufactured (by pressure in a cylinder) from a composition of waste slate, vegetable or mineral pitch or resin, and a small portion of animal or vegetable fibre or bristle. They offer the advantages of cheapness, comparative lightness, and facility of connection with each other, or with other pipes, jointing being effected by bringing the ends of the pipes together and passing a hot instrument over them, when the pipes will cement by running one into the other, or when softened at the joint a portion of the same composition may be used as a solder, as shown by the joint in the pipe No. 1. By boring with a hot augur, any description of branch pipe may be at once introduced, or a tap, as shown by the pipe No. 2.

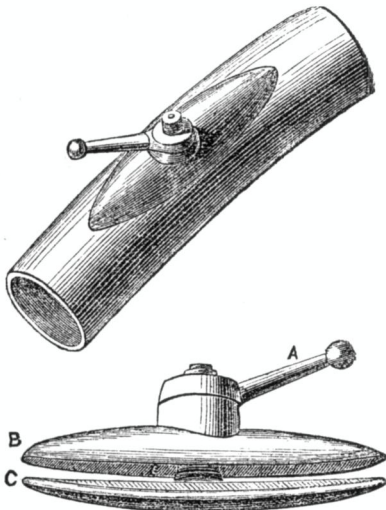
18. Patent Portable Pump, or Fire-Engine; Wm. Roberts, Millwall, Poplar, E.

19. Patent Metallic Clamp for Fire-Engine Hose, Flexible or Compressible Tubing, &c.; Robert Dawbarn, Wisbech, Cambridgeshire.

The object of this clamp is to close rents or fractures in piping. It consists of three separate pieces of metal, indicated by the letters A, B, and C. Band C are two plates fitting accurately upon each other, and to each is given the necessary concavity to suit the curve of the hose or pipe to which it may be applied. From the centre of the lower plate, C, rises perpendicularly a screw, which, passing through the upper plate B, enters a collar tapped to receive it. On turning the bent lever A, which is attached to the collar, the two plates are brought into contact. When the clamp is applied, the lower plate is inserted in the tube beneath the rent or fracture, and a few turns of the lever are sufficient to effectually

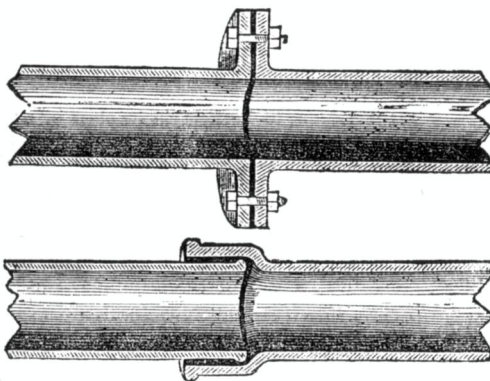
close the leak. The time required for its application, under ordinary circumstances, is less than a minute. In addition to its special utility to fire-engines, it is capable of application to many other purposes, as in manufactories, breweries, ships, and wherever else flexible piping is employed.

(See drawing, No. 239.)



20. Newcastle Vulcan Cement ; S. and E. Ransome, and Co., 21, Essex-street, Strand, W.C.

This cement is stated to contain nothing injurious to metals, and to possess the property of hardening rapidly after being applied, whilst it makes a



strong joint, capable of bearing vibration and not being affected by the contraction and expansion of the metal. It has to be mixed with boiled linseed oil, and upon the application of steam or other heat to the joint, it soon sets.

21. Patent Rotary Steam Engine ; R. A. and M. Jefferson, 30, North-street, Saint John's-wood, N.W.

This combination has been arranged principally with the view of avoiding dead weights and destructive friction, so detrimental to rotary engines, without increasing the difficulties of manufacture ; to effect which the covers are dis-

creasing the size of the hub which carries the piston ; the slides are hinged to the covers, and are so arranged that while in motion they have no weight of steam upon them ; they are worked by two lateral cams fixed on the axle, which axle is retained in adjustable bearings to keep it in the centre of the cylinder ; the steam enters and escapes through the axle ; it is always on, the power on the piston being the same in all positions. The model illustrates the action of one-half of the engine.

(See drawing, No. 232.)

22. Improved Safety Lamp for Coal Mines ; Chas. Edwd. Crawley, 17, Gracechurch-street, E.C.

This Lamp combines Crawley and Schneider's improvements with those of Howden and Thresh. Its advantages are stated to be—1st. That it gives considerably more light than any other description of safety lamp without the use of glass ; this is effected by means of a tube, open at either end, fixed in the bottom of the lamp, passing through the wick, and protected at the lower end by a double gauze. 2nd. It can be immediately extinguished without trouble. 3rd. It has an insulated handle, which enables the miner to carry it for any length of time without burning his fingers, even were the rest of the lamp to become red hot. 4th. It seldom, if ever, will become red hot, whatever quantity of gas may be burning inside the gauze. 5th. It will, on account of its peculiar construction, consume, whilst burning with a good flame, from one to two feet of gas per minute, thereby tending under ordinary circumstances, to some extent, to lessen the danger. 6th. The lock is rendered perfectly secure by means of a seal, consisting of a very small thin metal disc (with any kind of device stamped upon it), fixed over the lock in such a manner as to render it absolutely impossible for the miner or any one else to open the lamp without breaking the seal, thereby forming a perfect detector. The seal would be varied from day to day, so that the miner would never be able to tell what seal would be used on any particular day. 7th. The great increase, however, in the light would of itself remove the temptation to open the lamp, added to which it gives, if anything, less light when opened.

23. Specimens of Machine-puddled Balls of Iron ; William Yates, 31, Parliament-street, S.W.

These specimens of iron were made by Tooth's patent self-acting puddling machine, which is a wrought iron cylinder, lined with fire bricks, and driven by steam power. The charge of pig iron is introduced at the chimney end of the barrel ; in the door is a hole for inserting the rake, and which also serves for a peep-hole to watch progress. The barrel is kept stationary during the fixing of the pig, after which it is set slowly rotating and kept so moving till the charge has gone through all the usual stages of boiling, working dry, and dropping, which takes about an hour. The iron now begins to gather into a mass ; the speed of the barrel is accelerated to solidify and shape the balls ; the workman now, for the first time, has to put a tool to his charge, to cut off from the lump pieces suitable for his requirements ; the fire box is now shunted away and the orifice through which the flame had entered the barrel serves as the opening

through which to admit the tongs, which are attached to a small crane affixed to the standing frame of the cylinder; thus the balls are extracted ready to be sent to the shingling hammer and rolls.

24. Patent Double Corrugated Iron Plate; Moss and Campbell, Sheffield.

This plate is stamped cold, the corrugations being at right angles to each other, and when two plates are united together, so that the corrugations interlock with each other, a resistance to strain is obtained over the whole surface of the joint.

25. Patent Metal for Bearings, Ships Sheathing, &c.; John Gedge and Son, 11, Wellington-street, Strand, W.C.

This metal is a composition of copper, zinc, and iron. From its toughness it is stated to be a suitable metal for bearings of railway rolling stock, or fixed machinery, and being cheaper than copper, and equally unaffected by sea-water, can be used for sheathing ships' bottoms.

26. Patent Carriage Axletree; Ebenezer Partridge, 14, Park-street, Stourbridge.

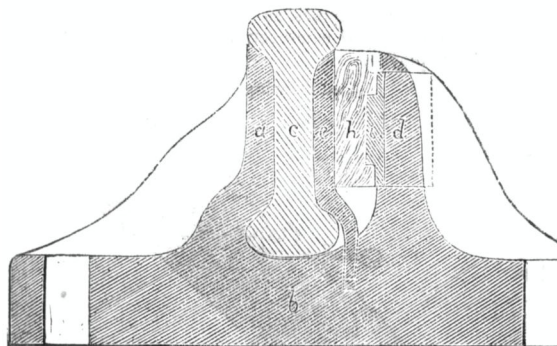
27. Patent Lead Plate, being Sheets of Iron coated with Lead; Edmund Morewood, Forty-hill, Enfield, Middlesex.

28. Improvements in fixing and securing the Rails in Cast-iron or other Chairs; Edward Gatwood, 2, Priory-terrace, Holmer, near Hereford.

It will be seen by reference to Fig. 1 that the inner surface of the jaw (a) of chair (b) is made to fit one side of the rail (c), and the inner surface of the jaw (d) is made in the ordinary way. Between the surface of the inner jaw (d) and the rail (c) a plate (e) is inserted, having on its outer side a projection or projections suitable to enter the recess or recesses in the chair (b); or this plate can be made of a kind of angle-iron, with a piece cut out of the centre, so as to form a projection on each side of the chair, which projection will act as a stop, and prevent this plate (e) from sliding whilst the key (h) is being driven in. This plate may also be used with ordinary chairs. In using either or both of these plates, a wood key (h) is employed, of suitable size and form, either taper or not, compressed or not, according to the requirements of the case, with a thin plate (i) upon one side, a projection on which fits into a recess in the wood key, preventing it from being cut or injured by the jaw of the chair whilst it is being driven home, and consequently causing it to drive much tighter, and thereby the better securing the ends of the two rails in the chairs. The other side of the wood key is perfectly plain. The plate (e) having been inserted, and the wood key (h) having been driven home, the ends of the thin plate (i) are turned or bent back from the wood key, or a nail or screw may be put through this plate (i) into the wood key (h), either of which modes is to prevent the wood key from working

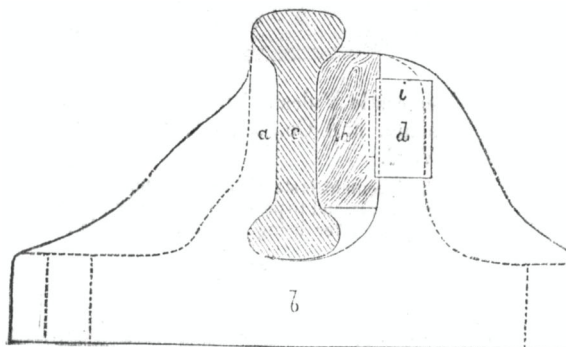
out of its place by shrinkage. Fig. 2 shows the same, or nearly the same apparatus, as employed

FIG. 1.



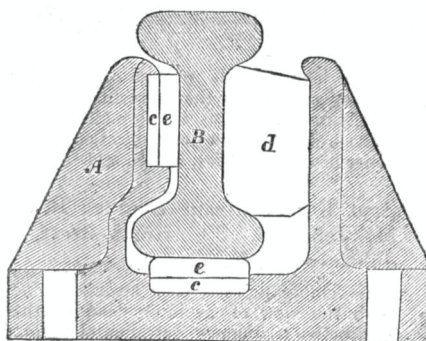
to an intermediate chair, omitting the plate (e) shown in Fig. 1. In securing the rails in the intermediate chairs, the aforesaid plan may be adopted, by only using a wood key (h), pressed or otherwise, with a thin plate (i) on the side of the key coming in contact with the jaw of the chair (d), this iron plate, of parallel or

FIG. 2.



wedge shape, to be kept in its place by a projection on the side next the wood key (h), and when driven home, the ends of the thin plate (i) are turned or bent back from the wood key, or a nail or screw may be put through this plate (i), either of which modes is to prevent the wood key from working out of its place by shrinkage.

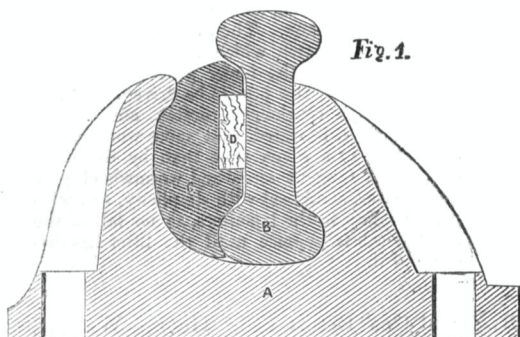
29. Patent Railway Chair; Thomas Leaville Truss, 53, Gracechurch-street, E.C.



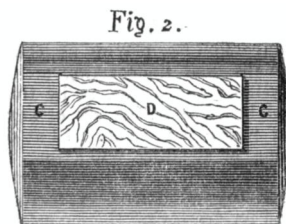
A wooden seating with chemically prepared

wool packing, is introduced at the bottom between the rail and the chair.

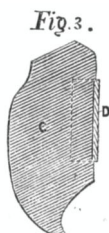
30. Patent Key for Securing Railway Rails; James Morris, 8, Albert-square, Clapham-road, S.W.



- A, An ordinary intermediate chair.
B, A piece of rail fixed in the chair.
C, The patent iron wedge securing the rail.
D, The small piece of wood inserted in the wedge, to act as a cushion and prevent the jarring of the two irons coming together.



- C, Flat view of the wedge.
D, The small cushion of wood.



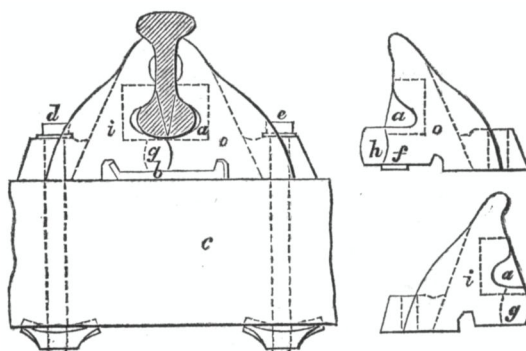
- C, End view of the wedge.
D, The small cushion of wood.

These keys for rails are constructed in the following manner. They are made principally of metal, and shaped so as to fit between the cheek of the chair, of whatever description, and the web of the rail, partly filling up the space between the flanges of the rail. On that side of the key or wedge which is towards the rail, a recess is made, and into this recess a small piece of wood on the flat of the grain is fitted, so as to project slightly beyond the surface of the key or wedge. Thus when the key or wedge is driven into its place, the surface of the wooden filling piece will bear against the web of the rail. Keys thus constructed are stated to hold more securely, and to be more durable than wooden keys, and at the same time they have not the rigidity of a key made entirely of metal; they are much less

liable to be broken or become loose by the vibration of trains passing over them, which is one great objection to keys made entirely of metal. The small piece of wood is also completely protected from exposure to the weather, and is not affected by either heat or wet, so as to shrink or swell. (See Drawing, No. 235.)

31. Sayer's Patent Railway Chairs; Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

These chairs are intended for joint and intermediate chairing on railways constructed with single or double T-headed rails. Each joint chair, as may be seen in the illustration, has a cast-iron fillet, *a*, cast into the chair. The object of this fillet is to prevent the rail sliding forward out of



the chair (which is apt to occur where the traffic is great or the gradient steep). If the course of the railway be straight, allowance for the expansion of the rails should be made, by not bringing the ends close up to the fillets. The outer half of the chair, *o*, with the wrought-iron plate, *b*, beneath, is first laid on the sleeper, *c*, and fastened to it by the fang-bolts, *d*. To lessen the concussion, and make a tighter joint, a piece of felt may be placed in the chair. The rail is then placed in the half, *o*, and the inner half, *i*, is then placed and fixed to the sleeper by the fang bolts, *e*, perfectly keying the chair and bottom plate, *b*. The snugs, *f*, on the bottom of the outer half of the chair, drop into slots in the bottom plate, *b*, preventing the plate working out, and, with the rounded joint, *g*, and the tongue, *h*, keep the half chairs together perfectly rigid and firm. It is only necessary to draw the inner fang-bolts, *e*, and slacken the outer bolts, *d*, two half turns, to set the rail at liberty, and replace it with another.

32. Patent Rails, and Bedplate Iron Girder Sleepers and Rails Combined, to block in level with the Paving Stones or Macadam, for Street Railways; Thomas Wright and Co., 9, George-yard, Lombard-street, E.C.

No. 1 shows section of the twin rail, made in wrought or cast iron, and applied to both wood and iron sleepers, also to the bedplate iron girder sleepers and rails combined, suited to both flanged and plain wheels, either with or without grooves in the rail surface. No. 2, Section of twin rail, modification of No. 1. No. 3, Model, full size, showing the bedplate iron girder sleeper and twin

rail combined, also the tubular iron sleeper and twin rail combined, which contains eight separate wearing surfaces "chilled." This model shows the iron sleeper and rail combined laid into the pavement, or between stone blocks, and level with the surface of the road, as in actual use, with a section of a flanged wheel, and also a section of a plain wheel, showing the real effect of both as in practical operation, and that they do not obstruct or endanger the free circulation of the ordinary street vehicles. Loose raised rails with fastenings are not employed, as the Solid Bedplate Iron Girder Sleeper and Rail combined block in level between the stones, and without transverse tie bars, consequently there are no loose rails with their fastenings to be deranged and knocked into pieces, involving danger, continual expense, and the disturbance of the pavement and traffic for repairs; and clear access exists between the bedplate iron girder sleepers for the repairing of gas and water pipes. No. 4, Section of the single or double-headed "tyre bar rail," applied to both wood and iron sleepers, and made in wrought or cast-iron. No. 5, Section of bedplate iron girder sleeper and tyre bar rail combined. The sleeper joints are fished. No. 6, Section of bedplate iron girder sleeper, and "curved" rail surface combined, for working clean in contact with the wheel tyre. No. 7, Section of bedplate iron girder sleeper combined with the ordinary headed rail, made of cast or wrought iron, either solid or in parts. No. 8, Section of bedplate iron girder sleeper and "grooved" rail combined, laid in level with the road, which grooves are subject to every modification. No. 9, Tubular iron sleeper and grooved rail combined, with the joint fastening. The sleepers are made in lengths of 12 feet, and can be modified in size, application, and cost, to suit both light and heavy traffic in streets of towns and highways, and any shape of rail can be fixed to the bedplate iron girder sleepers, or be combined with them in one solid piece, and with hardened wearing surfaces.

33. Pile-Driver; T. E. Merritt, Rochester.

This pile-driver is, as regards the framing, of the usual construction. The peculiarity consists in employing a tangent screw and worm-

wheel in place of the usual gearing. The tangent screw is worked by cranks in the usual manner, and the axis of the wormwheel carries a grooved drum. In a perpendicular line above this drum is another grooved drum, the bearings of which are fixed at the upper part of the guides. There is a square chain running on these two drums. The chain is endless, and carries lifters, which, as the cranks are turned, elevate the monkey. The monkey continues to rise until the catch which is engaged by the lifter turns over the upper grooved drum; it then falls upon the pile to be driven. As this engine has a continuous motion, and is self-discharging, it is stated that more work can be done by it in a given time than by the usual one. The tangent screw and wormwheel give great power, combined with simplicity, and with perfect safety to the labourers, as no fall of the monkey can take place until the lifter has discharged it.

34. Patent Gas Retort Bed; George Walcott, 24, Abchurch-lane, E.C.

The improvements consist in the economising of fuel, by passing all the fire from the furnace through and through the materials to be acted upon, until the whole heat is absorbed; and also by feeding the furnace or furnaces with a current or currents of heated air to intensify combustion. The fire playing uselessly on the two side walls, and the covering arch in the commonly-built retort-beds, is, by this mode, employed beneficially. A six or any other sized bed of retorts can be changed at once, whether working or standing, into a four, three, two, or even to a one-bed, the retorts not in use being allowed to cool down. A method is also arranged for destroying the incrustation of carbon inside clay retorts. The patent retorts and furnaces are said to be more easily repaired than the ordinary kind, and the first cost is stated to be less. (See Drawing, No. 245.)

35. Chemical Tallow for Lubrication; J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

MACHINERY AND MANUFACTURING APPLIANCES.

(For the remainder of the Articles in this Section, see Drawings.)

40. Patent Machine for forming continuous "bats" of Fleece or "sheet sliver" of Wool, Cotton, &c.; James Ferrabee, and Co., Phoenix Iron Works, Stroud, Gloucestershire, and 75 and 76A, High Holborn, W.C.

The introduction of the machine called a "Condenser," which in the manufacture of woollen cloth prepares the thread or roll of wool called "slubbing" ready for the mule or spinning machine, rendered it necessary to have recourse to mechanical means for feeding the "scribblers" and "carders," in order to secure uniformity in the threads. For this purpose the plan designed by Thos. Walker, in 1840, has hitherto been generally adopted. It consists in taking in a transverse direction from one machine, its product in the form of a roping, and conducting it continuously to another machine, but this rolling or twisting of the fleece into a roping as it comes from the doffer is objectionable. The purpose of Ferrabee's Patent Machine is to take up the fleece or sheet sliver in its full width as it comes from the doffer of the scribbler or carder, and fold it into any required width or thickness, in layers upon an endless apron, at right angles to the direction in which it is stripped from the doffer, and so as to form an endless "bat" which may be fed continuously to another machine, or otherwise disposed of. The new machine is composed of a frame carrying an endless apron, which receives the "bat" of wool. On this frame is mounted transversely a compound vibrating frame, carrying an endless cloth or apron, and moving to and fro at an uniform speed, the apron at the same time moving at some appointed speed. The cross or bat apron also moves continuously. Provision is made for regulating the speed of the various parts of the machine, which can be readily adjusted to lay the most delicate fibre with unerring precision. To be put into operation the machine is placed with the receiving apron almost close to the doffer of a scribbler or carder, and as the sliver or fleece is stripped from the doffer by a comb or otherwise, the endless cloth or apron on the vibrating frame carries it forward, and, by means of the traversing motion and consolidating rollers, lays it on the endless cross apron, layer upon layer, to any required thickness. Thus a most thorough mixing of the wool is effected. Materials of different sorts and colours may be separately prepared and incorporated into one bat; the wool or other material is presented to the next machine in the best possible way for undergoing another carding operation, and with ordinary attention in weighing the wool to the first machine a perfectly level and uniform bat is conducted to the carder, and an uniform thread on the condenser secured.

41. Patent Knot-Stitch Sewing Machine; Newton Wilson and Co., 144, High Holborn, W.C.

42. Patent Double-Action Lock-Stitch Sewing Machine; Newton, Wilson, and Co.

43. Patent Lock-Stitch Family Sewing Machine; Newton, Wilson, and Co.

44. Patent Self-acting Sewing Machine; James Boyd, Hither-green, Lewisham, S.E.

The object of this invention is the abolition of the fatigue consequent upon the use of the treadle. The self-action is obtained by means of an apparatus connected with the sewing machine, and which is set in motion by clock-work.

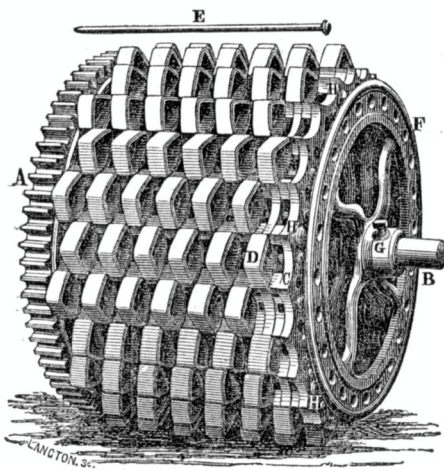
45. Improved Sewing Machine; Geo. Whight and Co., Station-road, Ipswich.

This is a machine, the needle of which, by its peculiar motion feeds itself, and thus renders the usual feed-apparatus unnecessary—thereby rendering all the parts much more simple and avoiding the difficulties incident to most machines, while working rough or loose goods—such as plush, or materials used in quilting with wadding between. The power being communicated directly from the driving wheel to the needle, with but very few intermediate parts, reduces the friction, and renders the machine almost noiseless in its operation, while it may be worked at great speed with comparative ease. The working parts are all adjustable, and can be adapted to all kinds of sewing.

46. Patent Improved Tappet Cylinders, for Fancy Weaving; Thomas Sibley, Moss-street, Ashton-under-Lyne.

The engraving represents one of the tappet cylinders. *A* is the driving-wheel, *B* the shaft, *C* the rings carrying the tappets *D*. The rings *C* are permanently bolted together, and to the wheel *A* by bolts *H H H* as these bolts are not interfered with when changing the tappets. The tappets are kept in their places by pins like that shown and marked *E*, and the pins themselves are retained in their places by a ring *F* which is fastened on the shaft *B* by a set screw *G*. When the set screw *G* in the boss of the ring *F*, is unscrewed, the ring can be turned till the holes

shown passing through it are brought opposite the heads of pins *E*, which can be then withdrawn and replaced when the tappets are arranged in the places they are intended to occupy; then the



ring only requires to be turned back, and fixed by the set screw, and the cylinder is ready for work. These improvements can be applied to all tappet cylinders of the class shown.

47. Patent Centre-Balanced Anti-Friction Weft Fork; Thomas Sibley.

This fork, instead of working on a pivot or pin, works upon two centres, so arranged that it can

FIG. 1.

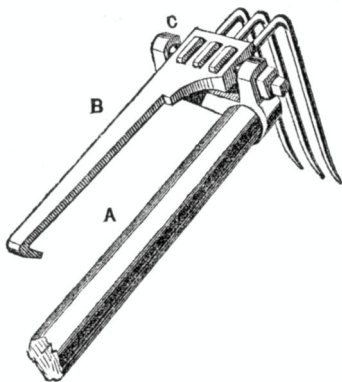
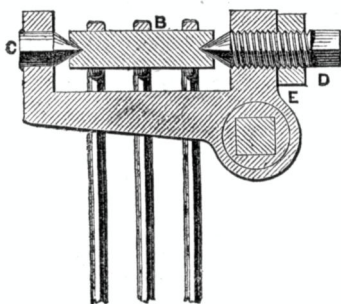


FIG. 2.



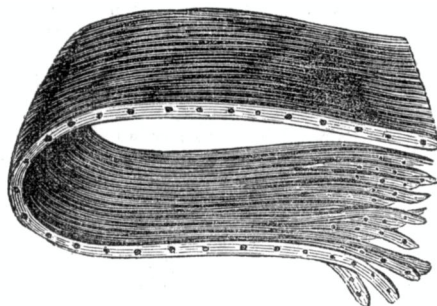
easily be adjusted to a great nicety, and secured in its position by a small lock nut on one of the screw centres. Fig. 1 in the above diagrams represents the fork with the improvements. Fig. 2 is a sectional view of the same, A being the fork-holder, B the fork, C the stationary centre, D the other centre, working in a screw thread in the fork-holder, E the lock nut, for fixing the centre when set to the necessary tightness.

48. Double Crank with Auxiliary Levers: J. C. Bowler, Bowden, near Manchester.

49. Patent Apparatus for Stopping Instantly the Moving Shafts of Machines; M. Marlaise, Aix la Chapelle.—Exhibited by L. de Fontaine Moreau, 4, South-street, Finsbury, E.C.

50. Bryant and Cogan's Patent Edge-laid Leather Driving Straps: James Ferrabee, and Co., 75 and 76A, High Holborn, W.C.

These straps are made from strips of leather of uniform width, set edgewise, and held together by metal rivets. By this mode of working the strap on the edge of the leather instead of on the

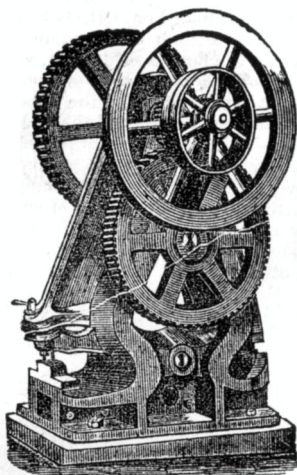


flat, all chance of cracking the grain of the leather and thereby weakening the strap, and ultimately breaking it, is stated to be avoided. These straps may be made of any required length, without laps or cross joints; their thickness being uniform from end to end, there are no weak places; and all unequal strain being avoided, they work smoothly and perfectly straight. They may also be used much slacker than the common strap, as the result of placing the edges of the leather in contact with the drum or pulley, insures a much larger amount of adhesion (or hugging, as it is technically termed) than is produced by the ordinary method.

51. Patent Punching and Shearing Engine; C. de Bergue and Co., Strangeways Iron Works, Manchester.

The inventor states that the improvements in this machine consist:—1st. In the entire absence of necessity for slides or guides for the punch and knives, their rigid attachment to the rocking lever maintaining their true position when in action. 2nd. In the simplicity and efficiency of the stop action. 3rd. In the addition of a pointer alongside the punch which is set to the pitch of the holes to be

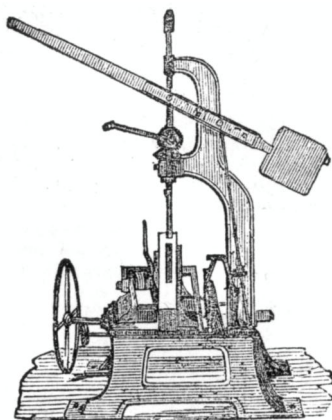
punched, and by which the workman is guided without looking to the punch.



52. Bench Punching and Shearing Machine; Joseph Fenn, 105 and 106, Newgate-street, E.C.

This machine is so arranged that the down stroke performs the punching operation, and the up stroke the shearing.

53. Patent Machine for Mortising and Tenoning Hard or Soft Wood and Boring Wood or Iron; Powis, James and Co., Victoria Works, Blackfriars-road, S., and 26, Watling-street, E.C.



54. Fuller and Davidson's Patent Tube Cutter; —Exhibited by John H. Fuller, 70, Hatton Garden, E.C.

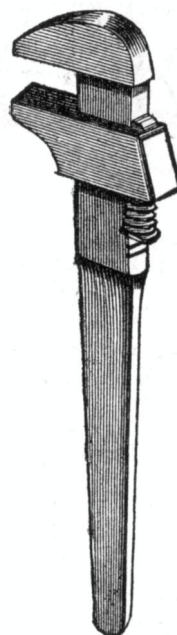
In this instrument the metal tube proposed to be severed is held at three points, irrespective of the cutter itself, so that the latter cannot cut deeper than intended by the operator and so get broken. The tube being severed, both pieces are left as smooth at the end as if the cutting had been accomplished by a parting tool in a lathe. The instrument exhibited is adapted for any tube not larger than one inch.

55. Specimens of Wheel-cutting and Twist-turning; T. E. Merritt, Rochester.

These wheels are stated to have been cut by a cheap addition to a lathe, by which any number of teeth, odd or even, can be cut in a wheel. The screws, also, were cut by an improved detachable addition to the lathe, by which any twist may be produced.

56. Patent Spanner and Screw Wrench; James Ferrabee and Co., Phoenix Iron Works, Stroud, Gloucestershire, and 75 and 76A, High Holborn, W.C.

The new feature in this spanner is the use of a wedge placed between the back of the stem and the moveable jaw. On this wedge the worm is fitted, which works into the teeth on the stem,

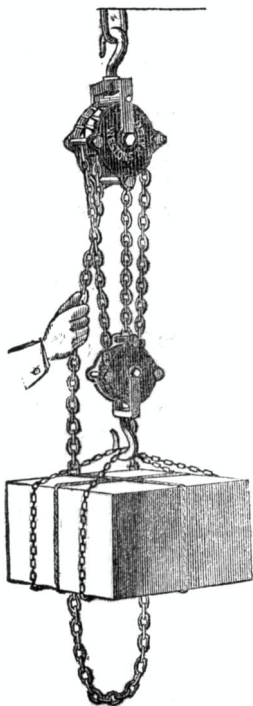


and moves the jaw up or down as may be desired. The wedge slides with the jaw, and is made sufficiently taper to prevent the jaw from sticking when the strain is applied. By this arrangement the strain on the worm and the teeth of the stem is removed, and the spanner acquires all the strength of a solid one.

57. Weston's Patent Differential Pulley Blocks; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.

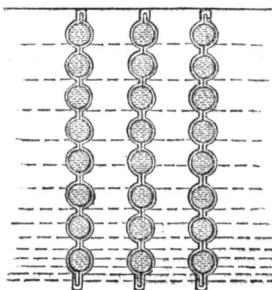
This block is constructed on the principle of the differential cylinder. In the specimen exhibited, the upper block has a double chain-wheel of two different diameters, with spaces respectively for 20 and 22 links of the endless chain geared to it, forming two loops, in either of which may be placed the single block, having a hook for attaching the weight to be hoisted. At each revolution of the double chain-wheel in either direction, 22 links of chain pass over the larger diameter, and 20 links over the smaller; each

loop hanging from opposite sides of each diameter, one of the loops is shortened, and the other equally lengthened. Reversing the direction in which the double chain wheel revolves, has a like effect on the motion of each loop. A weight, hanging by the single block in either loop does not run back, because the opposite sides of the loop pull against each other on opposite sides of

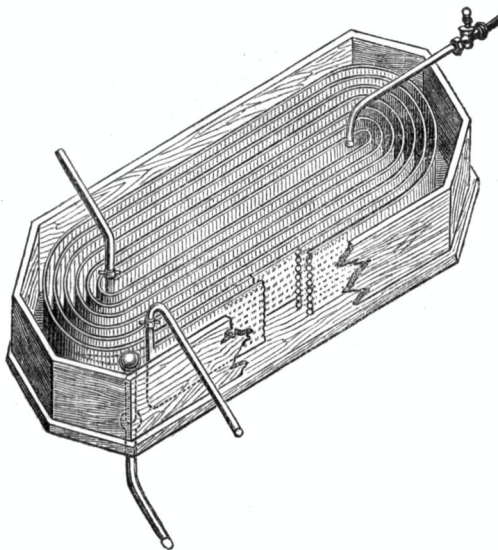


the double chain wheel. Even if the chain is suddenly released whilst hoisting or lowering, the weight will not run down. The purchase is 22 to 1, because, pulling 22 links of chain over the larger diameter, lifts the weight the length of one link. The purchase may be varied by varying the difference of diameters in the double chain wheel, or with the same difference of diameters, by equally diminishing or increasing them both.

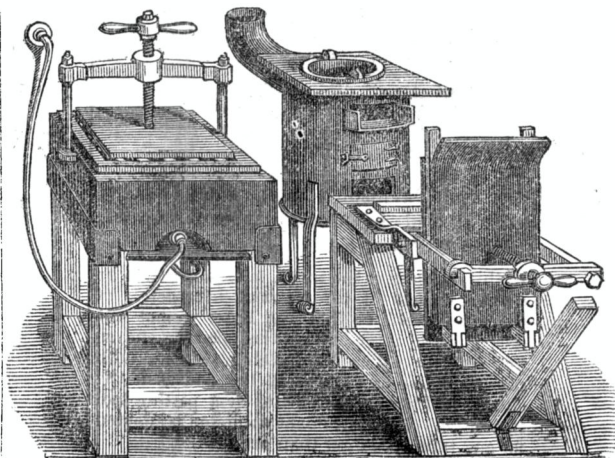
58. Patent Refrigerator; Robert Davison, C.E., 8, London-street, City, E.C.



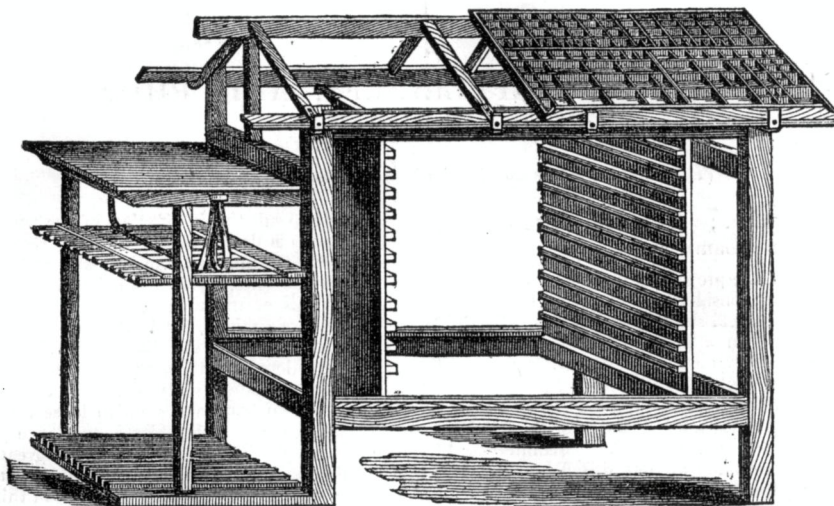
The improvements in this instrument consist in rivetting, soldering, and jointing together continuously two exceedingly thin corrugated copper plates (well tinned or electro-silvered) in such a manner as to form a large number of cells or tubes for the flow of cold water, whilst the fluid to be cooled is made to pass over the whole of the external surfaces of the tubes; the object being to bring the hot and the cold into as direct a contact with each other as possible, by employing a very thin and good conducting medium between them, and at the same time so constructing the machine as to ensure perfect and easy access to every part for cleansing. The corrugated plates are equally applicable to heating and other purposes, and are so patented.



59. Improved Papier Maché Stereotyping Apparatus; James Wood, 89, West Smithfield, E.C.



60. Patent Printer's Composing Case and Frames; H. W. Poulter, 28, Thayer-street, Manchester-square, W.



The object of the improvements is first to diminish the number of compartments or boxes in the case, and thereby to reduce the distance the operator's hand is required to traverse in picking up the types and spacing the lines out. For this purpose some of the compartments—namely, those devoted to the reception of accented vowels are omitted, and a better disposition of other of the boxes or compartments is obtained, reducing the whole to one case. Further, some of the partitions of the boxes are formed of zinc or other suitable metal to gain space.

61. Portable Self-Acting Card-Printing Machine; C. Langdon Davies, 2, York-villas, Sydenham-park, S.E.

In this invention the cards to be printed are placed in a box mounted in position, so that the lowest card when projected through an aperture in the front of the box shall enter between a pair of small cylinders by which the printing is per-

formed. One of these cylinders is coated with india-rubber, while the other has engraved, cast, stereotyped, or electrotyped in relief on its surface, the design to be printed, the ends of the cylinder being left in relief to nip, or take hold of, the cards, and to turn the inking apparatus by effecting frictional contact with bearings on the ends of the inking rollers. The cards are fed up one at a time by a step on a slide traversing the bottom of the box. Motion is given to this slide by projections on the printing cylinder, which take hold of rods connected with the feeding slide, advance it a certain distance, and then release it, when it is carried back by springs in readiness for the next card. To perform with this machine all the operations of printing, it is only necessary to turn a handle. The pressure of the printing surface on the card, and the supply of ink, may be regulated to the greatest nicety by screws arranged for the purpose. The inventor states that a machine, $5\frac{1}{2}$ inches long, 4 inches wide, and 3 inches high, would print upwards of ten thousand cards per hour. The machine may be driven by a clock spring.

NAVAL AND MILITARY APPLIANCES, AND PHILOSOPHICAL APPARATUS, &c.

(For the remainder of the Articles in this Section, see Drawings.)

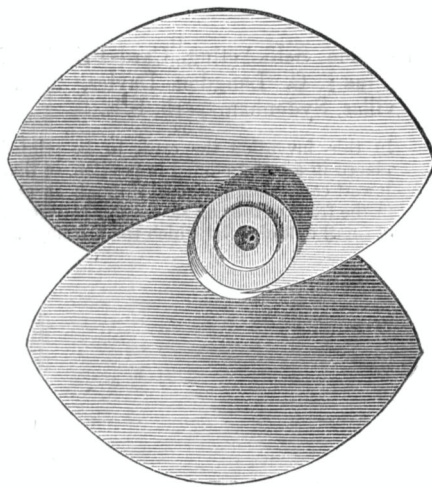
70. Patent Propeller; Hermann Hirsch, 65, Bridge-road, Lambeth, S.

The form of the propelling surface may be best understood by considering it projected in section, 1. On a cylindrical surface consecutive with the axis; and, 2. On a plane perpendicular to the axis. I. The cylindrical projection is a curve, the entering edge of which is inclined to the plane of revolution at such an angle that it coincides with the resultant of the vessel's velocity forwards, combined with the circumferential velocity of the blade at that distance from the axis where the section is taken, while the back or leaving edge of the blade is inclined somewhat more to the plane of revolution, or coincides with the resultant of the vessel's velocity, plus slip combined with the circumferential velocity of the blade. From this curvature it results that the blade, as it passes through the water, gives every particle that meets its surface a gradually increasing velocity backwards, and thus receives a constant reactive pressure forwards over its whole surface, without producing sudden shocks or breaking the water into foam. II. The projection of any section of the blade on a plane perpendicular to the axis, is an archimedean spiral. Every point of the surface is thus inclined to its radius at such an angle, as to overcome a great part of the centrifugal force which would be given to the water by blades radiating in straight lines from the centre. The backwater from the propeller is thus rendered less broken or divergent, and consequently more directly reactive in propelling the vessel forwards, and more effective on the rudder for giving ease and rapidity of steering. The effect of the combination of the two curvatures is to extend the propelling surface of the blades over a greater portion of the circle of rotation, and so to divide its action on the water as to make the impulse smooth and gradual, and obviate almost entirely the vibration resulting from straight-bladed propellers. The arrangement for altering the pitch of the blades and securing them on the boss is as follows:—An inner boss is made with two conical surfaces turned on an axis perpendicular to the shaft, with slots on each side to form recesses for bolts that pass through the boss of the propeller with certain space for clearance. The blades are cupped so as to fit accurately on the coned surfaces of the inner boss, and are formed with recesses for receiving the heads and the nuts of the two bolts which secure them thereon. The recesses for the nuts are made of sufficient size to admit a socket wrench for loosening or tightening the nuts, and are filled with pieces shaped to the surfaces of the blades. When the blades have been set round on the conical boss to the desired pitch, the nuts are tightened up, a wedge-shaped filling-piece is placed on each nut, and the upper filling piece (which is slightly sloped on its under

side to suit the inclination of the wedge-shaped piece,) is driven tightly into the recess, so as to strain the nut down in its place, and secured by a screw entering it from the back of the blade. By this arrangement great simplicity and security are attained, for instead of numerous bolts, nuts, keys, and the like, which in many other propellers have to be adjusted and secured whenever the pitch is altered, there are in this case only two bolts and nuts to be secured, and the wedges and filling-pieces are large and easily handled without the necessity for great care and delicacy. It is found practically that the blades of a large propeller, constructed in this manner, can be shifted and secured again in a few minutes.

71. Improved Eccentric Propeller; W. H. Crispin, Stratford, E.

In this propeller the power is stated to be greater than that of a screw of the common form containing the same area, it being less liable to be clogged or fowled; for, while revolving, it repels any floating substances which may be near it, the blades also clearing each other. Facilities are also attained for turning astern, and the ship



will steer better—a large portion of the rudder being below the action of the propeller. The edges of the blades (which are flat and not forming any portion of a screw) may be made thin and sharp, and, being on the curve, will divide any cordage, &c., with which they may come in contact; and, when applied to ships of war, they possess the advantage of being, under all circumstances, entirely submerged. Either spherical bosses or cylindrical spindles or shafts may be employed. (See Drawing, No. 249.)

72. Improved Plug for Boats; E. P. H. Vaughan, 15, Southampton-buildings, Chancery-lane, W.C.

73. West of England Ship and House Lantern; P. I. Marshall, 32, Treville-street, Plymouth.

This lantern has an octagonal stand, supporting a circular metal frame, the upper ring of which is connected to the lower by small rods or bars. There is a circular glass fitting into the metal frame, and also fitting round the candle-holder,



which can be removed. The candle-holder has holes formed in it, to admit air into the lantern from the stand, which is also perforated. There is a chimney above the candle which can be removed, and a reflector placed round the chimney and resting on the upper edge of the circular

glass, which can also be removed. There is an octagonal cover hinged to the upper ring of the frame, and the upper part of this cover is perforated, for the exit of gas and air, and is further provided with a cap, having a round bottom, the lower part of which is exposed to the heat and smoke arising from the candle, which pass through the perforation round it. There is a handle with a swivel eye in the centre, for suspending the lantern. The lantern is provided with a hasp for fastening, and further secured by a pad-lock.

74. Major Rhodes' Patent Volunteer and Rifle-Practice Tent; S. W. Silver and Co., 66, Cornhill, E.C.

The supporting frame-work of this tent is composed of a series of straight laths, rods, &c., which, radiating from the apex of the tent in an inclined position to its eaves, and from thence prolonged by vertical rods or supports to the ground or base line, form its chief point of construction. At their junction they are hinged and braced. The eaves and ground ends of the supports are further strengthened by means of two continuous ropes—wire-ropes or such like ties. Although the model is of an hexagonal shape, square, octagonal, oblong, or other forms can be constructed. The frame is covered with a prepared waterproof cotton tissue, double on the roof, and, if requisite, the sides are of double tissue. The model represents an hexagonal tent on a scale of 9 feet diameter—8 feet 6 inches to the apex—and the height of walls to the eaves is 5 feet 9 inches. The weight of a 9 feet Volunteers' Tent, complete with screw pegs and storm-lines, and packed in a strong canvas covering, is from 80 to 90 lbs.



75. Patent Open-Air Cooking Apparatus ; Samuel Terrill, Redruth, Cornwall.

This apparatus consists of six ovens, four for baking and roasting, and two for warming ; it has also an arrangement for four boilers for hot water, meat, and vegetables. Over the fire there is a hot-plate for general purposes. On the top of the stove, on each side of the chimney, there is an opening on which vessels may be placed for boiling. This model shows a double stove, but it can very readily be made as a single stove, with only three ovens on one side, instead of three ovens on each side. The stove can be used for ships, barracks, camps, &c.

76. Patent Rifle-Sight Guard and Regulator ; Captain Jaques, Droylsden, near Manchester.

The face-sight of the rifle is protected by a rotatory collar, the ramrod keeping it in position

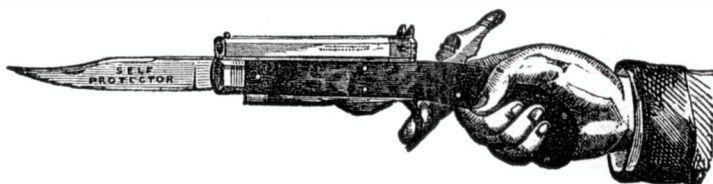
by acting as a spring at the back of it. When shooting, the collar is turned half round, and the sight exposed for use.

77. Patent Compression Trigger ; Matthew Paris, Hill-side, Wimbledon, S.W.

This trigger is pressed, and not pulled, by the finger, and in the inventor's opinion is less liable to accident. A lighter sear spring is used than in the ordinary trigger, whereby greater accuracy in practice is obtained.

78. Saloon Pistol Knife ; Unwin and Rogers, Rockingham Works, 124, Rockingham-street, Sheffield.

This article contains a penknife and self-protector blade, which may be either shut or left open and used as a bayonet. An ammunition box is attached to the pistol and knife, forming the handle, which will contain a number of charges

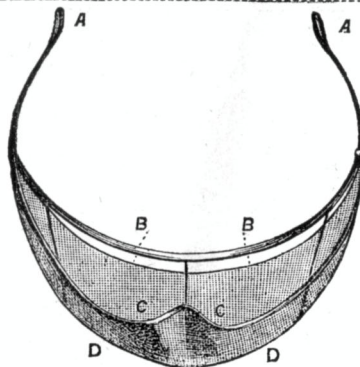


or bullet caps. The pistol knives are loaded at the breech ; the bullet cap or cartridge should be inserted when the hammer is at half-cock ; the hammer can be either pulled to full-cock ready for discharging, or let down upon the cap and left ready until required. When the hammer is pulled up the trigger will come out ready for use. After the piece is discharged, the spent cap must be pulled out with the reliever, and a fresh one introduced in its place ; they can thus be loaded and fired several times a minute.

The Occhiombra is constructed to exclude wind-dust, and excessive light. It consists of a light

79. Bi-valve Inhaler ; John White, Finchley, Middlesex, N.

In breathing through this instrument the air to be inhaled and the exhaled air are guided through separate channels by means of two valves, capable of being moved in opposite directions by the passing air ; and the air to be inhaled is brought into contact with a perforated disc kept wetted by revolution, with half the depth of its diameter in water or medicated water, as shown in the form of the inhaler A, or the air to be inhaled is brought into contact with a wetted surface, as in another form of the inhaler B, by filling the upper chamber of the vessel with the liquid and connecting it with the lower chamber of the vessel by means of cotton threads or other substance along which the liquid can be moved by capillary attraction, and through which the air to be inhaled is guided by the valve. By such contact with water or medicated water, hot or cold, the air is purified or medicated, and warmed or cooled respectively.



80. The Occhiombra or Patent Transparent Ventilating Eye-Shade ; J. Calkin, 12, Oakley-square, N.W. — Exhibited by Weiss and Son, 62, Strand, W.C.

wire frame, part of which resting on the nose passes close to the face beneath the eye, passing upwards to the temples—the other part of the frame presents the usual appearance of an eye shade, but is more symmetrical in its outline. A lengthened portion of the upper part of the frame passing round the forehead, is double, leaving an opening between the two portions for the free escape of heat generated by violent exercise. The whole is covered with gauze or other material—either single, double, or treble, to meet in the latter cases the requirements of those suffering from any affection of the eyes, and in the former the mere desire of protection from wind, dust, and sun. The whole forms a closed chamber, admitting the free use of spectacles; the shade fits the head by its own elasticity, and is placed and removed with perfect ease—its weight is half an ounce. It is intended for travellers by railroad, and those who visit the sea-side.

81. Bivalve Respirator; John White, Finchley, Middlesex, N.

By means of two valves fixed in separate chambers, and which valves are capable of being moved by the breath in opposite directions, the air to be inhaled and the exhaled air pass over separate surfaces, and therefore the inhaled air is not loaded with the moisture and other impurities of the exhaled air, as in other respirators, but it is warmed.

82. Invalid Tongs; Weiss and Son, 62, Strand, W.C.

These tongs are for taking hold of anything out of ordinary reach from the bed or sofa. They are also useful for a library table, or in a shop, for taking down anything from a window or glass-case.

83. Hydraulic Eye-drop Tube; J. C. Savery, M.R.C.S., Marina, St. Leonards.

This tube has a portion of its side elastic, and thus a drop of fluid may be drawn up, and easily ejected by renewed pressure.

84. Rostaing's Compounds of Gutta Percha with Mineral and Vegetable Colours and Substances for Dental and other Purposes.—Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

For dental purposes the crude gutta percha is first purified from earthy and other matters soluble in boiling water, and then from oily and odorous parts soluble in alkalies; it is then heated to 110 deg. or 120 deg. Réaumur, to soften the substance; oxyde of zinc, dense white or coloured, and a preparation of tannin, are added, and the whole carefully mixed, and when it is desirable to give an agreeable odour, oil of peppermint or lavender, or an essential oil, mixed with a solution of gutta percha in chloroform, is added. Some of the preparations exhibited are composed of gutta percha and a mineral combination of blende, kaolin, and calamine, varied by the addition of a little catechu. The patent mineral colours used in combination with the gutta percha are unalterable and non-poisonous.

85. Angola Belt; W. Elstob, 19, Woodstock-street, Oxford-street, W.

This belt is to be worn round the loins, and is so shaped as to prevent pressure upon the stomach.

86. Elastic Air Pads or Cushions for Trusses, and the Covering of Truss Springs with Elastic Rubber; J. Blackwell, Surgeon's Cutler, 3, Bedford-court, Covent-garden, W.C.

87. Patent Machine for Exercising the Human Body; John Milnes, Bristol-road, Gloucester.

88. Specimens of Aluminium and Aluminium Bronze; Bell Brothers, Washington Works, Newcastle-on-Tyne.

The specific gravity of aluminium is 2.5, or about one-fourth that of silver, and thus, weight for weight, the bulk of aluminium is four times the bulk of silver. It does not tarnish by exposure to the air, has no perceptible odour or taste in the mouth, is malleable, can be forged, either hot or cold, equally well with gold and silver, and rolled into thin sheets or leaves; is ductile, so as to be capable of being drawn into fine wire. It further resembles silver in elasticity and tenacity, and, when cast, in hardness. When hammered, it takes the character of wrought-iron, with elasticity and considerable rigidity, sounding like steel, when let fall on a hard body. It is extremely sonorous, and Mons. Lissajous has made tuning-forks of it, which act extremely well. It melts at a temperature a little above that of zinc, and considerably below that of silver. Aluminium may be readily run into moulds, and when heated to a high temperature in the crucible, loses none of its weight. From experiments made by Deville, he deduces its power of conducting electricity to be eight times that of iron; and as a conductor of heat it stands high amongst metals. According to this chemist, water, whether hot or cold, has no action upon the metal, even at a red heat near the point of fusion. It is, however, slowly oxydised when steam is passed over it at a white heat. Sulphuretted hydrogen has no effect upon it, nor has sulphur itself, so long as the metal is not heated higher than a red heat, though at a higher temperature they combine, forming sulphide of aluminium. Sulphuric acid, so diluted as to attack metals which ordinarily decompose water, has no action upon it whatever; and, according to De la Rive, the contact of a different metal, as in the case of pure zinc, does not help to dissolve the metal. Nitric acid, weak or strong, at the ordinary temperature, does not act on it, but when boiling it slowly dissolves it. Hydrochloric acid, whether weak or strong, is the true solvent for aluminium. Alkaline solutions have an energetic action on it, but caustic alkalies have no effect upon it, even when in a state of fusion. Ammonia exercises a feeble action. The organic acids, such as vinegar, tartaric acid, etc., have little or no action on it. The effect, however, of a mixture of vinegar and salt is different, for in this instance a small amount of hydrochloric acid is set free, which acts on the metal, but even this action is extremely slow, much slower than on tin. The salts of tin, too, have a strong flavour, whilst the salts of aluminium are less

in quantity, and have little or no flavour. Deville considers that the action of sea water on aluminium is decidedly less than on copper. It can be gilt or plated by galvanic agency, but acid instead of alkaline solutions must be used. A coating of copper may in like manner be given. The effect produced on it by saliva is very slight, scarcely perceptible, even when the metal was kept for a long time in the mouth. Up to the present time no solder for joining it has been found which is satisfactory, though it is stated that M. Mourey has succeeded in this object, but his process is not known. M. Hulot has proposed to effect this object by covering the surface with a deposit of copper, and then employing the ordinary solders. The solution of this problem would tend much to bring the metal into general use. The alloys of aluminium and copper forming what is termed aluminium bronzes, are remarkable. That composed of 10 per cent. of aluminium and 90 per cent. of copper, is probably the most remarkable. It is a perfect chemical combination, and has no tendency, as is the case with ordinary alloys, to separate under the influence of heat. These proportions represent an exact number of chemical equivalents of the two metals. Aluminium bronzes are of a yellow or orange colour, closely resembling gold, and take a fine polish equal to that of steel. The chemical properties are the same as those of other copper alloys. In tenacity they fully equal steel. Drawn into wire No. 16 gauge, the breaking strain of copper, according to Mr. Gordon, was 190, of iron 280, of aluminium bronze 434; showing a strain of 84 kilogrammes to the square millimetre. Good French iron, in Deville's experiments, broke at a strain of 60 kilogrammes the square millimetre, and steel wire at a strain of from 90 to 100 kilogrammes. It thus appears that steel, and that of a fine quality, only can stand a comparison with aluminium bronze in respect of tenacity. As regards hardness, a comparison was made between a steel and a bronze groove for the guide blocks of a locomotive engine, and, after six months' use, no trace of wear was perceptible; the bronze gave a result equally good with the steel. It was also tried for the journals of the front wheel of a locomotive, with excellent results, its great malleability, combined with hardness and tenacity, rendering it well adapted for this purpose, where ordinarily a very brittle alloy is used. The bronze containing 10 per cent. of aluminium can be rolled at all temperatures, from cold up to a bright cherry red. It rolls well at a bright red heat, breaks less and elongates more than pure red copper. It is difficult to roll cold, and after a number of passes through the rolls, it elongates no further; it is then necessary frequently to reheat it, as it hardens rapidly under the rolls. It is desirable to roll it at as high a temperature as possible, short of fusion. Reheating and plunging in water to cool, renders the alloy more tractable than simply reheating without dipping. If reheated to a bright red heat, and not dipped in water until it has been left to cool in the air down to a low red heat, it is sufficiently malleable and ductile, when cold, to bear without breaking the ordinary manipulations in working it, except some descriptions of stamping.

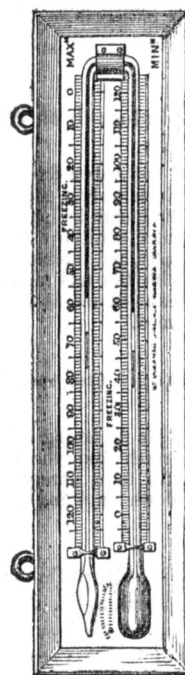
89. Improved Lind's Anemoscope; J. Charles Savery, Marina, St. Leonards.

The scale is fixed and greatly enlarged, the cowl

only moving in a tube of glycerine. The scale tube is charged with water, and a self-registering index can be applied.

90. Dimenueon Thermometer for Registering the Maximum and Minimum Temperature; Frankham and Wilson, 12, Wilson-street, Gray's-inn-road, W.C.

The bulb of this thermometer is filled with a fluid considerably denser than the spirit heretofore used for the purpose. In this consists the novelty of the invention. By thus using a dense fluid, the thermometer may be placed in a horizontal position without getting out of order

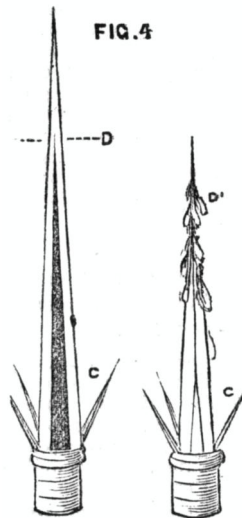


thereby securing increased portability. The fluid selected expands equally like mercury. The indices are of steel, incased in glass, consequently they cannot corrode, and, having no springs, may be set either with or without a magnet. In the horizontal arrangement of the tube the equilibrium of the fluid is not disturbed when the thermometer is exposed to low temperatures.

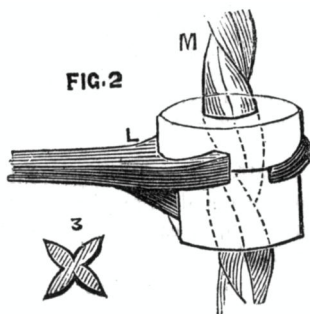
91. Lightning Conductor and Fittings; James Spratt, 118, Camden-road Villas, N.W.

Fig. 4, letter C, shows the platinum silver alloy reproducing lightning conductor point, the object being to provide against the destruction of lightning rod points by melting, as not unfrequently happens from an overcharge of the electric fluid. This is effected by forming the point of different metals or alloys, imbedded one within the other, arranging the most fusible to the outside, and so on in succession, each metal terminating in a fine point. The effect of this arrangement is that the fusing action of an excessive shock of electricity is confined to the

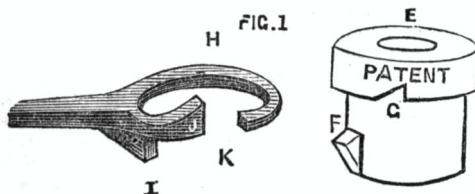
outer metal surface or layer, which it melts, and in flowing may be said to carry the electric fluid with it, or rather it becomes, in the act of melting, an additional conducting power; the metal so melted, destroys the outer point, but at the same time the point D, of less fusible metal



is produced equally as efficient as the first. C D also represents a point that has passed through this electric ordeal. Fig. 2 shows the

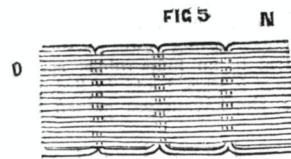


patent glass lock insulation and metallic attachment L complete. Fig. 1, letter E, the glass insulator. F the lug or stop. G the indent that forms the lock. H the metallic attachment.



I the stop to stay the lug F on the glass insulator. J the tooth to correspond, and fall into indent G, which locks the insulator and prevents its displacement. K, the opening permitting the entrance or withdrawal of the rod at any time, and also to allow the lug F on the insulator to descend, and thereby to pass round to the stop I on the attachment. Fig. 5, N the flat woven

lightning conductor, composed of positive and negative elements, to produce constant electrical



excitation in the conductor, thereby favouring (as it is stated) the conducting powers of the lightning conductor. Fig. M the cross section



of the conducting rod shewn No. 3, Fig. 2, by which arrangement a small amount of metal presents a large surface and affords great strength. The leaves or bars of this form of rod may be either straight or spiral.

92. Method of Coating Electric Telegraph Wires; Joseph Rogers, 9, Queen-square, Bartholomew-close, E.C.

The conducting wires are coated with a suitable insulating material. Strips of woven fibre, tapes, or felt, previously saturated with a compound that furthers the insulation, are then bound round. Cords or wires, which have been previously covered with yarn, and prepared by a heated cement, are laid round in one or more series; if more than one series, then each alternate series is laid in an opposite direction, and bound round with wire, wire and yarn, or woven fibrous material, or braided over, the binding wires being used to regulate the gravity and protect the cable from abrasion.

93. Submarine Telegraph Cables; Josh. Rogers.

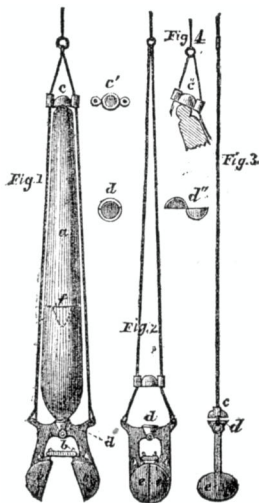
The conducting wire, or strand of conducting wires, is first insulated with India-rubber, or gutta-percha, or both; they are then surrounded with a strengthening of flat plaited bands or cords, which have been previously prepared by immersion in a cauldron of heated cement, and are bound round and compressed in one or more series previous to receiving an external braiding of yarn, which is again saturated with a compound which renders the cable impervious to water or the attacks of animalculæ. If more than one conductor is used, they are laid together and bound round with strips of woven fibre, tape and thread, but braiding over is preferable; any number of conducting wires can be enclosed.

94. Telegraphic Wires and Cables; John Macintosh, 40, North-bank, Regent's-park, N.W.

95. Deep-Sea Sounding Machine; G. C. Wallich, M.D, 17, Campden-hill-road, Kensington, W.

The improvements in this machine consist, 1st, in the abolition of any permanent shaft or cen-

tral piece, and in causing the sinker to perform the temporary office of such shaft during the descent of the instrument, at the same time that, by its weight, acting at *d*, it serves to keep the cups open; 2ndly, in the provision of an independent closing power for the cups, this being supplied by an india-rubber spring or band, as shown at *b*, Figs. 1 and 2; 3rd, in the detaching cap, *c*, the advantages gained by this arrange-



ment being, that the cups and cap only having to be hauled up from the bottom, the weight and resistance are reduced to a minimum; there is no risk of the specimen of the bottom being lost by accidental opening of the cup when being hauled up; and lastly, there is simplicity of construction, together with shape best adapted to sink rapidly through the water. Fig. 1 shows the machine as descending; Figs. 2 and 3, as being hauled up, front and side views; Fig. 4, the disengaging action of cap; *c'*, view of cap from below; *d'*, *d''*, views of conical seat for sinker, as seen when cups are open or shut; *f*, dotted line, showing mode in which sinker is divided into two portions, the apparatus of which may be employed alone at moderate depths.

96. Patent Bivalve Diving Apparatus: John White, Finchley, Middlesex, N.

This apparatus enables the diver to breathe under water by means of two pipes communicating with his mouth and the air, each of which pipes is furnished with a valve capable of being moved by the force of the breath in a direction opposite to the other, so that the air to be inhaled and the exhaled air pass through separate channels, and the thorax and abdomen are encased in an inflexible material to the end that the weight of the water shall not prevent the action of the respiratory muscles.

97. Patent Life Scarf; T. Ayckbourn, 17, Bond-street, Vauxhall-cross, S.W.

This is a life preserver in the shape of a scarf, which is constructed of ordinary materials, but doubled, and within the inner folds of it, at suitable distances apart, are placed a series of hermetically sealed india-rubber air tubes, cured in the sulphur bath, so as to stand any climate. It

is passed round the neck, across the chest and back, and the ends tied in a knot in front.

98. Patent Life-Vest; T. Ayckbourn.

This is constructed on the same principle as Ayckbourn's Patent Life-Scarf. The vest is made of a stout material, to cover the chest and back, having shoulder straps, and an opening at one side only. The material is double, and throughout the area of the chest, internally, are placed about 18 india-rubber air tubes hermetically sealed, whilst about 12 of them are placed on the back; when worn under a Guernsey frock it presents no awkward appearance, and does not hinder ordinary work or rowing, and is stated to be far preferable to cork for buoyancy and convenience.

99. The Stereotrope or Stereoscopic Thaumatrope; William Thomas Shaw, 110, Bunhill-row, E.C.

This instrument consists in an application of the principle of the Stereoscope to that class of instruments variously termed Thumatropes, Phenakistoscopes, Phantascope, &c., which depend for their results on "persistence of vision." In these instruments, as is well known, an object represented on a revolving disc in the various positions it assumes in performing a given evolution, is seen to execute the movement so delineated; in the Stereotrope the effect of solidity is superadded, so that the object is perceived as if in motion, and with an appearance of relief, as in nature. Pictures for this instrument may be varied infinitely, the only limit being the skill and ingenuity of the photographer, and it is peculiarly fitted for the representation of all kinds of machinery in motion. (See Proceedings of the Royal Society for Jan. 10th, 1861.) (See Drawing, No. 255.)

100. Patent Self-Acting Photographic Washing Apparatus and Chemical Filter; John Moule, 15, Seabright-place, Hackney-road, N.E.

This is intended for washing photographic prints and collecting the silver from the washings. The prints are placed on the false bottom of the washing trough A, which is supplied with water by means of the tap F. When the water rises to the height of the lip of the funnel of the waste-pipe B, it passes into "the float chamber" beneath; and, when this chamber is filled to a certain height, "the float" begins to rise, and, at the same time, it lifts the valve attached to its upper surface, which, when at rest, accurately fits a conical hole in the bottom of the trough A: this is in consequence emptied of its "washings," which, in the first place, pass into the float chamber, and ultimately (by means of an aperture in its upper part and a syphon tube covered by the float) into "the mixing chamber." As soon as a sufficient amount of liquid has accumulated in this to reach the top of the tube J, it passes down into the "salting chamber" H, and is there saturated with chloride of sodium, by means of crystals of that salt placed in a perforated compartment, I. As soon as the washings have accumulated sufficiently high to reach the top of the syphon C, and start the same, a flush takes place from the chamber H, and a part of

its contents return charged with salt, and the mixture is then carried over into "the precipitating chamber" MM, by the action of the syphon C; here the chloride of silver formed settles to the bottom and accumulates, and the superabundant liquid is carried off, after passing through "the filter" D, by a waste-pipe E. This filter is formed of a perforated tube, filled with cotton wool and zinc filings, so arranged that any particles of unprecipitated silver salts that may have escaped the first attack may be reduced by the zinc and retained in the interstices of the wool. G is an air tube, which, however, may be connected with the developing sink, so that its draining may be carried into the lower vessel M. K is a capped tube, for drawing off the supernatant liquid, when it is wished to re-

on the perforated bottom, I, is calculated to be sufficient to precipitate about fifty ounces of silver; and, beyond keeping the compartment I charged with salt, no other attention is requisite. The washing trough may be used as a sink where developings are carried on, by which a large amount of silver can be saved which is at present lost.

101. Patent Mica Magic-Lantern Slides for Dissolving views, &c.; F. Leiss, 31, Queen-square, Bloomsbury, W.C.

These articles, hitherto painted on glass, are made of the mineral mica, by printing figures, groups, &c., upon sheets of this mineral. These coloured sheets are fixed between glass.

102. Patent Tenor Horn; George Macfarlane, 15, Draycott-street, Sloane-square, Chelsea, S.W.

This Horn has a revolving bell, to throw the sound in any direction the performer pleases. The arrangement is also applicable to other brass instruments.

103. Patent Pianoforte Expanding Desk and Adjusting Candle Slides; H. Brooks and Co., 31 to 34, Cumberland-market, Regent's-park, N.W.

The music desk is divided in the centre, and may be expanded so as to give a wider support to the music. The candle-rests slide on a bar.

104. Patent Self-Fixing Music Stool Screw; H. Brooks and Co.

The head of the female screw in which the male screw works is notched, and studs attached to the head of the male screw are pressed into the notches when the stool is sat upon.

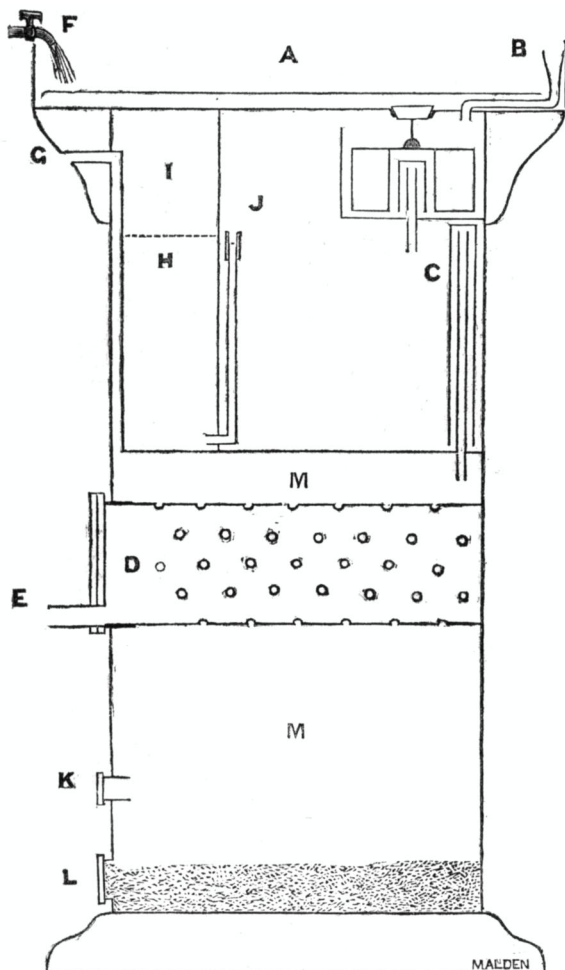
105. Patent Eight-Day Weight Clock Beating Seconds; John Aitken, Watchmaker, Dalry, Ayrshire.

This improvement is more particularly adapted for turret or other clocks, where the necessary depth for the length of the pendulum cannot be conveniently obtained. In this invention the back fork or crutch which imparts momentum to the pendulum is fitted on the pallet or bar, with the crutch extending upwards, or in a direction the reverse of that in which it has hitherto been employed. The crutch is prolonged beyond the pallet or bar, in a downward direction, to serve as a counterpoise weight, keeping the upper part in a vertical or balanced position, and so that it will not fall over either to the right or left until acted upon by another force. The point of suspension is raised above the crutch at least twice the length of the upper part of it.

106. Religious Watch or Clock Dial; Amott, Brothers, and Co., 71, St. Paul's Churchyard, E.C.

107. Patent Inlaid Silver Watch-Cases; Henry Williamson, 10, Russell-terrace, Chapel-fields, Coventry.

These cases are inlaid with gold in various patterns.



move the precipitated silver salts through the stoppered aperture L. All the parts exposed to the action of the solution are constructed of a material that is impervious to water and the chemical action of acids, &c., and, therefore, not likely to readily get out of order. The frequency of the change of water in the trough B is regulated for any given interval of time by the adjustment of the supply by means of the tap F. The compartment H, once charged with a saturated solution of salt, and rock salt placed

AGRICULTURAL IMPLEMENTS, MACHINERY, &c.

(For the remainder of the Articles in this Section, see Drawings.)

120. Patent Steam Cultivator; J. T. Carter, Sydenham, S.E.

This machine cultivates the width of half a rod of land at once, and it will finish the land ready for the seed, or it may be left in ridges for wintering. The steam engine is portable, and can be detached from the machine and used for other purposes. The machine only requires one man and two boys to work it, and it is stated that it can cultivate from 7 to 14 acres per day.

121. J. and F. Hancock's Patent Pulverising Plough; Andrew McLaren and Co., 174, Upper Thames-street, E.C.

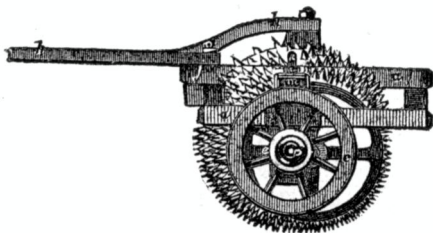
This implement consists of three ploughs attached to one beam, all acting in the same plane, but at different depths. Thus the first share may be adjusted to cut two inches deep and turn over the parings into the bottom of the furrow; the second share may be adjusted to cut two inches below the first share, and turn this portion of the soil on the first parings; and the third share can be adjusted to cut two inches below the second share, and turn the whole of the cut soil on the two preceding cuts; thus burying the grassy top, and covering it with a fine tilth of pulverised soil the whole depth of the furrow, making a better seed bed than it is possible for the plough, harrow, and drag, all put together to produce.

122. De Buyer's Cast Iron Plough Wheels; Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

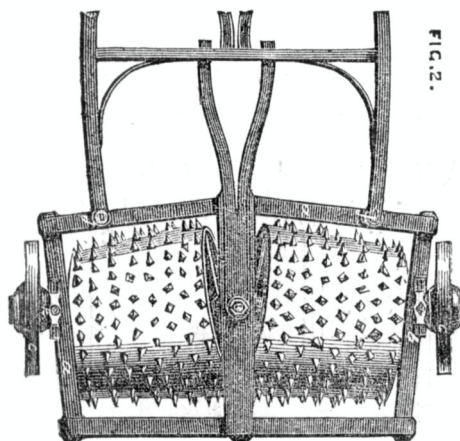
The improvements consist in casting the wheel in one piece of cast-iron, or casting over a partial or entire skeleton of wrought iron. The nave is formed for the admission of a wooden or an iron axle, and has within it a cavity intended to hold grease and lubricate the axle. These wheels are very light and strong, and are said to be produced (as compared with other wheels) at a very small cost.

123. Machine for Breaking up Macadamized Roads; James Braby, jun., 32A, Newington Causeway, S.E.

FIG. I.

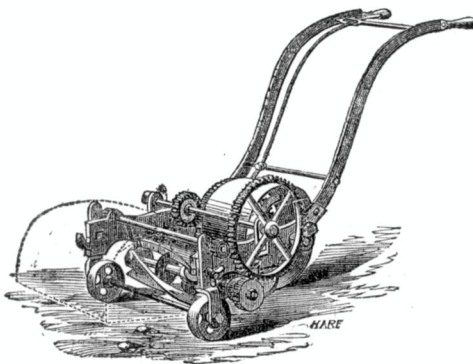


This machine is intended to supersede the use of pick axes on Macadamised roads. It is formed of two conical rollers, placed at certain angles to each other, and provided with transporting wheels which are adjustable at pleasure. It is drawn by horses, and the shafts are made to turn on a



centre pin, so that the horses can travel in the opposite direction without turning the whole machine round. The machine produces the same results when propelled forward in either direction. (See drawing No. 237.)

124. Patent Lawn Mower; James Ferrabee and Co., Phoenix Iron Works, Stroud, Gloucestershire, and 75 and 76, High Holborn, W.C.



This lawn-mower has all the working parts disposed and supported in an iron frame which is cast in one piece, thereby securing simplicity and strength. The handles are of wrought iron, and

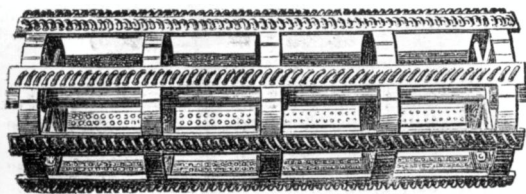
the adjustments of a very simple character. The machine is light, and may be worked easily by a boy; it is therefore available on the smallest lawns.

125. Patent Brush Lawn Mower, with Mainwaring's Patent Silent Gear; James Boyd, Hither-green, Lewisham, S.E.

This is an improvement upon Boyd's brush lawn mower. The self-cleaning and sharpening apparatus of the old machine is by this arrangement made completely silent, and at the same time the power required to work it is lessened.

126. Patent Combined Garden Roller and Seat; Tindall and Maude, Sherwood Foundry, Mansfield.

127. Patent Staple Beaters and Concave, for Thrashing Machines; T. W. Ashby and Co., Rutland-terrace Iron Works, Stamford, Lincolnshire.

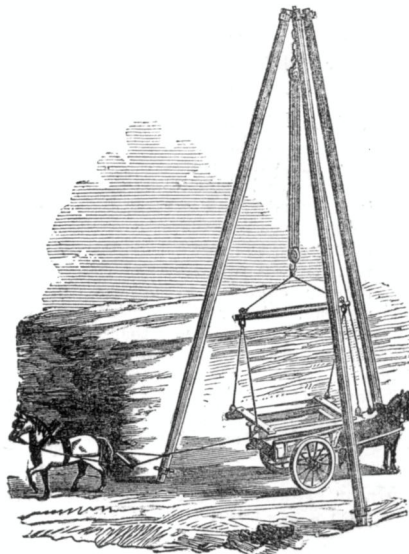


These beaters are constructed of a series of wrought iron bows or staples fixed diagonally in wrought plates. The advantages of these beaters are said to be as follows:—1st, The staples, having a round surface, rub out the corn without the least danger of breaking, or in any way injuring the kernel. 2nd, The hollow under the staple affords the corn space to fall through instead of its having to pass over the beating edge. 3rd, The staple-beaters being open allow a current of air to pass freely through them when at work, thus the resistance to the atmosphere is lessened, and the blast being reduced, less power is required to drive them. 4th, These beaters have a double action, both sides being alike; when one side is worn, the drum can be taken out and reversed; the beaters then work again the same as new. 5th, Being made entirely of wrought-iron, they are remarkably strong and durable. The concave is perforated, and made to match the beaters. The corn is driven through the open spaces where it is rubbed out. It does not damage the corn or the straw.

128. Patent Hay and Corn Lift; Archibald White, Great Missenden, Bucks.

By this lift the horse or horses bringing the load to the rick raise it, and it is suspended by the side, and with its bottom level with the then top of the rick, thus making all the pitching from the load to the rick down and underhand. The lift consists of a tripod of poles 45 feet high, with pulley tackle suspended from under its top, terminating in a stretcher and slings, which slings are attached to the four corners of a frame in a cart or waggon, and the frame taken up with the load, or to a lifting piece passed under the front of the body

of the cart or waggon, and another at the back, when the frame is dispensed with, and the body of the cart or waggon, without the wheels, axles, or carriage, taken up with the load. The tripod is easily raised by a horse, and when placed on the little carriages, and the stretchers placed be-



ween its legs, may be moved while up from rick to rick. It is also easily lowered by two men. Beyond making all the unloading underhand, the usual mode of building ricks is not interfered with. By the use of the lift, ricks may be built double the height they usually are, and thus one bottom, one top, and one thatching be saved.

129. Patent Apparatus for Drying Hay, Corn, &c.; Archibald White.

The Apparatus consists of a building, or close chamber, about 70 feet long, 10 feet high, and 9 feet wide, having inside three tiers of rails, one above another, its entire length, and fans at one end to force in the current of cold air by which the drying is effected, and open at the other end, to allow the moist air to escape; the hay, &c., is placed on shallow carriages, formed of open wooden frames, covered with wire netting and running on the rails, so that it is exposed on all sides to the current of air; along the entire length of the chamber is a shed, under cover of which the carriages containing the hay, &c., to be dried are put into the close chamber through its side openings, taken out to be turned, and finally taken out for removal to the stack. Gravity is made to cause the carriages to pass from the open end of the chamber to the fans, and to cause them to pass into and out of the close chambers. On each tier of rails are seven carriages; when one next the fans with its dried contents is removed, the other six on that tier pass, by gravity, one carriage width nearer the fans, and the other carriage laden with wet hay is placed on those rails at the open end; the opening to the shed through which the carriages pass have sliding doors, which are kept closed, except when the carriages are passing in or out. It is calculated that at least two waggon loads of hay or corn may, by this apparatus, be dried per hour. The fans may be turned by steam or by horse

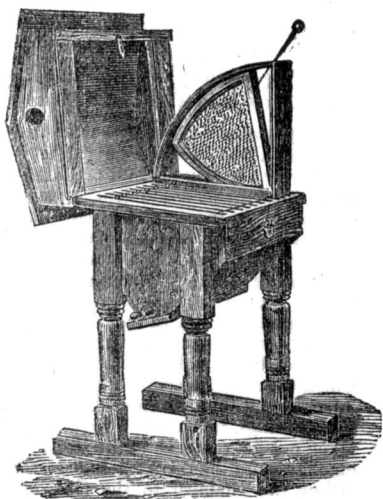
power, or by a sufficient weight run up by lifting tackle under a high tripod, and acting in its descent as a weight acts in turning a spit when roasting. The apparatus may be a building of itself, or be put up in a barn, in which case the roof and open shed may be dispensed with, and the cost would be reduced about one-half.

130. Hancock's Patent Butter Machine; Andrew M'Laren and Co., 174, Upper Thames-street, E.C.

This machine is for purifying butter from acid and buttermilk, and also for cooling it in warm weather, without touching it with the hand. The butter is taken from the churn and placed in a cylinder, and pressed with a screw piston through a perforated plate at the bottom of the cylinder, with a tub of cold water. This operation may be repeated, and the butter will be thereby chilled and purified in the hottest weather. Butter having been thus treated will keep good much longer than when it is worked by the hand, as the heat of the hand imparts a greasy character to the butter, which militates much against its keeping quality, even if the hand could extract the buttermilk from the butter as well as this process.

131. Major Munn's Bar-Frame Bee-Hive; W. J. Pettitt, Dover.

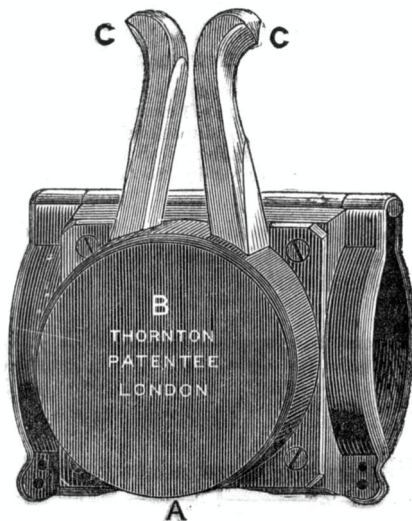
In this hive each comb can be lifted out and examined without interfering with any other part of the hive, or occasioning the loss of a single bee. The whole of the interior of the hive is open to inspection at any moment, and a choice can be made of the combs containing the most



honey; or the apiarian is enabled to trace the devastation of the wax-moth, and ascertain the presence of any other enemy, without the assistance of any fumigation whatever. The Ligurian queens can be introduced into this hive without difficulty, the glass observation frame affording

the necessary protection to the most timid operator.

132. Patent Rein Holder; E. M. Thornton, 6, Brooke-street, E.C.



This is a clip for securing the reins when out of the driver's hands, preventing them falling to the ground, or getting entangled in the horse's heels. It can be turned down below the level of the dash board when not in use.

133. Patent Mica Garden Labels; Frederick Leiss, 31, Queen-square, Bloomsbury, W.C.

These labels are manufactured of the mineral mica, in transparent laminae. The inscriptions being between sheets of this substance, and so protected, stand all degrees of heat, cold, or humidity.

134. Patent Gravity Potatoe Selector; James Anderson, 92, Farringdon-street, E.C.

The finest, mealiest, and most nutritious potatoes are always denser and heavier than the soft and waxy. By taking advantage of this difference in their specific gravity, the light and inferior potatoes are made to swim on the surface of a solution of salt, while the heavy and good sink to the bottom. By this contrivance, the dry and mealy potatoes are separated. In order to classify potatoes into three qualities, good, medium and inferior, let a solution having a specific gravity of 1.100 be put into one jar and a solution having a specific gravity of 1.080 into another. Very good potatoes only will sink in the first jar; the medium and inferior will remain floating on the surface. Let these be removed to the second jar, containing the solution of the lowest density; the medium quality will sink in it while the inferior will remain floating on the surface.

BUILDING AND DOMESTIC APPLIANCES.

(For the Remainder of the Articles in this Section, see Drawings.)

139. Ornamental Tiles; Maw and Co., Benthall Works, Broseley, Salop.

140. Artificial Stone, Building Bricks, &c.; Caroline Paine, Dippenhall Silica Works, Farnham, Surrey.

These imitations of Bath stone, bricks, and bracket, are all made of the building material, "Soluble Silica," which is stated to be more durable than natural stone, and less costly. It can be made of any colour.

141. Patent Circular Brick, Tile, or Pottery Oven; Wm. Basford, Patent Face Brick and Floor Tile Works, Burslem, Staffordshire.

The improvement in this oven consists in forming the mouths and fire draughts to back and front, and one fire-draught across the centre of the oven; thus it becomes a better conductor of heat, and larger ovens may be used, with less damage to the goods, than where the mouths are at equal distances all round. These ovens are adapted to burn red floor tiles or pottery ware.

142. Patent Oblong Kiln; W. Basford.

The improvement in this kiln consists in forming chambers along each side of the kiln, leaving space along the middle of the kiln to wheel bricks or tiles along to fill the chambers. These chambers are formed from three to four feet high, and the middle of the kiln is fitted in the ordinary way with chequered bricks.

143. Patent Method of Sheet Roofing with Slate; Rev. Thomas Martin, Summerton, Little Newcastle, Pembrokeshire.

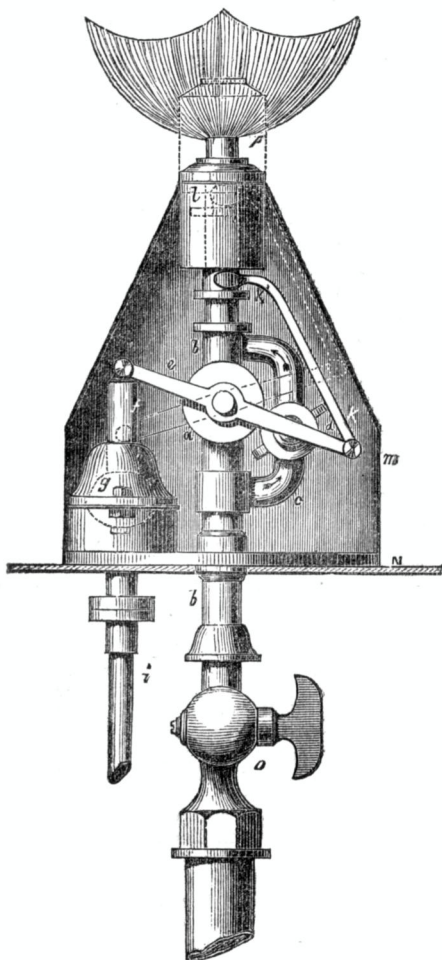
This roof, in its commencement, is formed with ordinary rafters; across these rafters battens are nailed down at such distances apart as will suit the sizes of the slate employed. The battens for ordinary roofs are made from three to four inches broad, and when using the size of slate known as duchesses, those battens are placed so that the distance from the centre of the one to the centre of the other will be one foot. If the size known as countesses is used, the distance from centre to centre will be 10 inches, and so on for the various sizes of slates in use. The slates must be prepared with square edges to make good clean butt joints. The rafters having been overlaid with battens, suitably arranged for the size of the slate to be employed (say duchesses), the roof is covered in the following manner:—To form the first ascending line so many slates are divided lengthwise as will suffice to extend

that line from the eaves to the ridge, and thereby are produced pieces six inches in width and two feet in length. With these pieces the extreme edge of the roof is covered, fastening down the slates to the batten by nails or screws, and the narrow ascending line is thus formed. This arrangement is necessary to effect a bond when the second layer of slate is put on. When the narrow ascending line is completed, succeeding lines of undivided slates are next placed upon the battens, and nailed or screwed down side by side, so as to form the lines 1, 2, 3, 4, 5, 6, each slate of which abuts against that placed above it, so as to make a butt joint therewith in the centre of the batten. A sufficient area having been covered with slates, the next process is to apply to the covering surface an adhesive waterproof cement. While this coating is still soft, the second layer of slates is applied, and, to ensure a good bonding, a lateral line of the duchess slate is formed, which will be one foot in width, the lower part of that line being nailed to the first batten, and the upper part of it nailed to the middle of the centre batten, the upper part of the middle batten receiving the lower part of the next ascending slate, which will then be abutted against the upper part of the longitudinal slate, the top of which has been nailed down to the middle part of the second batten. Upon this principle butt joints will be formed through the whole of the lines, and consequently a continuous connecting sheet line will be produced to any indefinite distance. The slates forming the covering layer are fixed as before with nails or screws, which passing through holes pierced for the purpose in both layers of slates by drilling or otherwise, enter the intermediate battens, or those to which the underlying slates were not previously attached, joining by that mode the whole area in one vast connecting sheet. For the adhesive waterproof cement, Portland cement is preferred.

144. Patent Safety and Indicating Atlas Sliding Chandelier; Richard Hugh Hughes, Atlas Works, Hatton-garden, E.C.

In these chandeliers the counterpoise or balance weight is in one circular piece (as a coronal) so that if one or even two chains break, it still remains the same height, the weight simply falling out of position, and should all the chains break simultaneously (a not very likely occurrence), the body and weight then fall upon a conical valve, and thus prevent any accident or escape of gas. Another advantage is that double the length of slide is obtained by these chandeliers; the light can be lowered nearer the table. An organ pipe is placed in the throat of the tube, so that immediately an escape of gas takes place it sounds a shrill whistle, which can be heard all over the house, thus indicating that more water is required in the tube.

145. Patent Gas Lamp Regulator; John Huggett, Eastbourne.



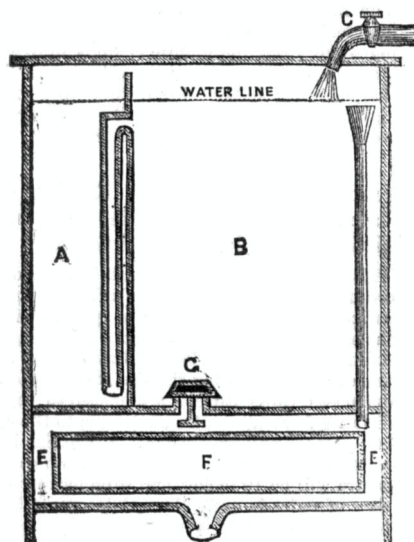
146. Patent Compensating Gas Meter; Frederick Hudson, 227, Blackfriars-road, S.

The chief object of this invention is the maintaining a constant water level in the measuring compartment of a gas meter, which is done by a series of troughs set in a zigzag arrangement, one above the other. The succeeding troughs being inclined to each other in such a manner that the lowest trough when caused to vibrate, shall deliver the water taken up by it into the end of the next above it, and so in succession as the series is caused constantly to vibrate to and fro, all excess of water beyond that necessary to keep up the constant level flows back to be again raised by the vibrating troughs. The series or combination of troughs, are put in motion by means of a crank or pin on the axis, usually employed to give motion to the registering apparatus of the meter. This crank pin is caused to act within an opening formed in the axis, on which the combined series of troughs is mounted, so that as the crank pin is caused to revolve, it alternately acts on the curved sides of the opening, and on the series of troughs in such a manner as to cause the troughs to incline first in one direction and

then in the other. The extra supply of water as heretofore, is contained in a suitable compartment of the meter. One or more of the lower troughs is constantly in the water so long as the supply is not used up, and provision is made to stop the supply of gas to the meter by closing the supply valve as soon as the troughs have no water to lift, and this is accomplished by means of a cup attached to the supply valve, so that in this compensating meter the following improvements are said to be obtained on the ordinary wet meters, viz., a "constant" standard of measurement within the range of the new Act. The meter cannot be overcharged (as this would stop the supply of gas), and it prevents consumers supply of gas from being shut off for want of water, as the meter is provided with a reservoir that contains sufficient water to supply it for six months.

147. Moules' Patent Self-Acting, Cleansing, and Purifying Apparatus.—Exhibited by Job Mead and Co., Trolway Works, Bethnal-green, N.E.

The woodcuts represent a reservoir, consisting of two compartments, A and B; A, containing the disinfecting agent—the other, water, which is admitted and regulated at pleasure by the tap C, according to the number of actions required. When the water has risen to the proper height, it is charged with its required portion of the disinfecting agent, and enters the lower cistern E, in which is a float F, in connection with a large valve G, which, opening as the float F rises, emits an immediate rush of water, together with the disinfecting agent. Afterwards the cistern again fills, and re-empties as previously described. Thus, by regulating the inlet of water from the tap C, the operations will take place at any given interval of time, or the action may be entirely stopped when not required.

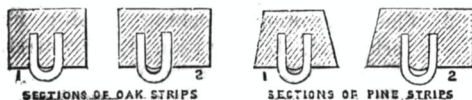


148. Carbonic Aerial Water and Air Purifier and Cooler; Joshua Jackson, 29, Queen-street, Wolverhampton.

This apparatus consists of a series of disks, fitted

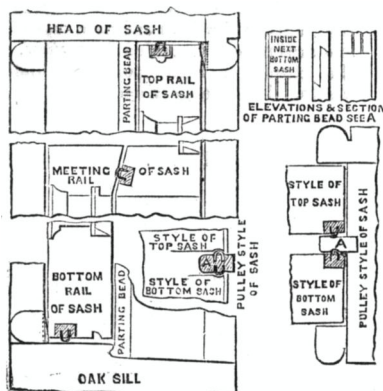
with pure wood charcoal, and arranged one above another (either suspended on chains or fixed on a stand) to the number of six, or more or less according to the requirement of the case. Above these disks is fixed a reservoir to hold the impure water. This reservoir is usually a bell-shaped vessel, with a valve or tap at its convex end. Below the disks is a receiver, which is either a jug, pan, or tub, or else a vessel similar to the reservoir. Above the purifiers is a disk, called a filter, which is either placed between the purifiers and the reservoir, or inside the latter. When the valve or tap is opened in the reservoir, the impure water flows through the filter, which retains its mechanical impurities, and then through the whole series of purifiers (which absorb its gaseous impurities) until it falls into the receiver. While passing through the purifiers, the water is exposed to the cooling and refreshing action of the air, which gives the apparatus an advantage over an earthen or glass filter, which excludes the air. When this apparatus is suspended over a burning lamp, it absorbs the noxious gases arising from the combustion of the oil, gas, or spirits, and also any such gases that may be floating in the air, thus keeping the air in the apartment sweet and fresh. When the purifiers are saturated with impurities, they must be boiled in water for half-an-hour, which must be repeated, if necessary, until they become as pure and efficient as when new. This apparatus is peculiarly applicable to rain water.

149. Patent Cloth Padded Wood Strips, for rendering Window Sashes, &c., Air, Dust, and Water Tight; John Brown, Architect, Norwich.

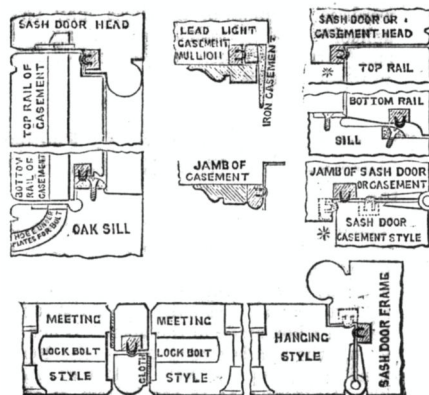


FULL SIZE.

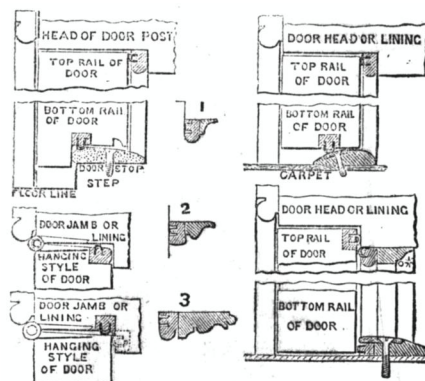
The plans and sections below (one-fourth full size) will explain the system of grooving or rebating the surfaces of work into which the patent cloth padded wood strips should be fixed, so as to secure the above desideratum. (See Drawing, No. 257.)



NO 1 FOR SASHES OF ORDINARY DESCRIPTION.

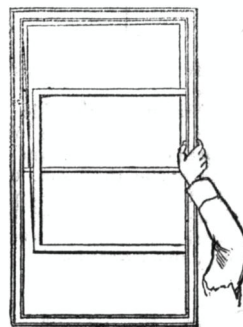


NO. 2 FOR FRENCH CASEMENTS, SASH DOORS, &c.



NO. 3 FOR EXTERNAL AND INTERNAL DOORS.

150. Patent Sash Frame; William Henry Elkin, 27, Belvedere-road, Lambeth, S.

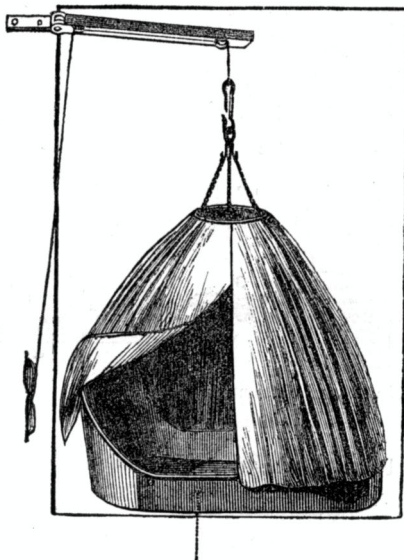


The improvement consists in that portion of the frame, called the pulley-style, being made loose instead of fixed; it is kept in its place by an elastic arrangement at each end, and the face of the pulley-style is thus made to press equally against the edge of the sash. The removal of the sash is effected by pressing it sideways against the elastic pulley style (as the cut represents), which yields sufficiently to allow the sash to be disengaged from the beads on the opposite side; the free side is then drawn inwards, and the other side of the sash liberated from the elastic style. The sash may then be turned inside out-

wards for cleaning, or the lines may be simply unhooked, and the sash entirely disengaged. The pulley styles can then be lifted out of the frame to repair weights or lines.

151. Domestic Fire Escape ; J. T. Pedder, 85, Murray-street, New North-road, Hoxton, N.

The apparatus consists of an iron hinge bracket which is tightly fixed into the wall of one of the upper rooms in the house at the top of the window. When out of use it is turned back against the wall inside the room, the rope being kept in a box made in the floor. When wanted for use the arm is swung out at the top of the window, the rope is then hooked on the chain. The steadying rope at the bottom of the chair is then to be passed into the street, for a bystander to gently draw the chair in its descent out of



reach of the fire for any person to get out of it when it reaches the ground. The felt curtains are then lifted up at the side facing the room, and the person gets in and is lowered by the rope which passes through the arm over the pulleys by any person in the room, or by passing the rope into the chair, and slipping it under the hook in the bottom, they can lower themselves, or by passing it into the street they can be lowered by the bystanders.

152. Safety Fire Escape, or Apparatus for Lowering and Raising Weights ; Martin Deavin, Builder, 28, Crystal-terrace, Rotherhithe, S.E.

This apparatus is intended for private use, and is applied by dropping the grip inside the window, and the framework of the machine outside. Attached to this frame are pulleys and racks, so arranged as to prevent the object going down with too great momentum. The cage, by means of the balance weight at the end of the chain, is kept in position outside the window to receive the person, whose weight immediately sets the machine in motion, the velocity of which

is scarcely accelerated, however great the descent. Immediately the cage is relieved of its weight, it ascends again.

153. Patent Incomparable Bed ; F. Ayckbourn, 17, Bond-street, Vauxhall-cross, S.W.

This bed consists of a case, made of ordinary ticking, shaped like a mattress, but divided internally into numerous separate cells or divisions. In each of these cells is placed a peculiarly constructed tube for holding air or water, either cold or heated to any required extent. The air-bag is larger somewhat than the cell in which it is placed, thereby rendering it incapable of bursting.

154. Relievo Coverings for Walls and Ceilings ; White and Parlyby, 49 and 50, Great Marylebone-street, W.

The basis of the material is plaster of Paris, which, combined with other ingredients, forms a compound inflexible mass perfectly dry, durable, and not liable to shrink or crack. It is especially adapted to large works in public or private buildings, in forming domed or wagon-headed ceilings, curved surfaces (however complex), coves, cornices, intersecting ribs and panels between ribs, together with all work of a like description, rendering plastering unnecessary where it is used.

155. Patent Equilibrium Chair ; Angelo Sedley, 210, Regent-street, W

156. The Reception Rocking Chair ; Frederick M. B. Bertram, 4, Gower-street North, Bedford-square, W.C.

The accompanying engravings will illustrate the invention. The lower frame of the chair is so arranged as to stand upon castors—not upon rockers—and the legs, instead of being placed in the usual manner at the four corners of the chair, are centrally placed at the front and back which makes the natural approach to it more convenient. The rocking motion is provided for by hinging the body of the chair to the underwork upon journals placed at the sides, and the motion is regulated by two spiral springs placed at the front and back. These springs are placed inside the front and back legs of the chair, and are entirely concealed from view, as are also the journals or axes upon which the chair vibrates. In the engravings—

FIG. 1.

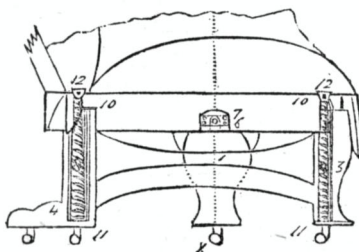


FIG. 2.

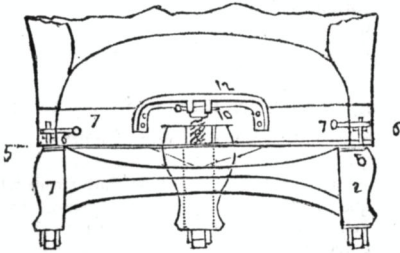
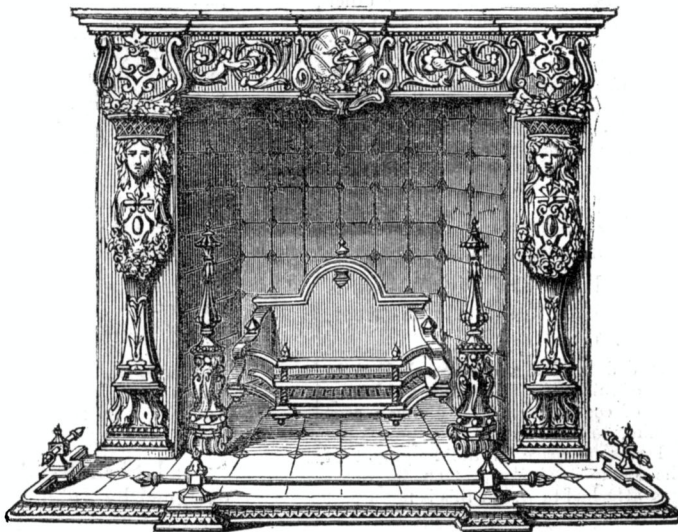


Fig. 1 is a central section from front to back, and

Fig. 2, is a section through the centre of the axis upon which the chair vibrates; 1, 2, 3, 4, are the legs of the chair; 5, 5, are the caps of the legs of which the tenons, 6, form a part. These fit into mortices, 7, in the body of the chair, or in irons attached to it. 8 and 9 are spiral springs, which regulate the rocking motion of the chair; 10 and 11 are the fastenings at the ends of these springs; 12 is a bar to which the rear spring is secured at the top. The chair may be fixed at any angle by means of a grooved stationary plate, 13, attached to the back leg of the chair, and the bolt, 14, which is secured to the seat frame. This allows the occupant to recline in any desired position.

157. Majolica Chimney Piece and improved Fire Grate; exhibited by Thomas Goode and Co., South Audley-street, W.



This chimney-piece was manufactured by Messrs. Minton and Co., and is the first produced in this country. The fire grate is for wood or coal, and has a fire clay back and electro-bronze fire-dogs. It was designed and manufactured by D. O. Boyd, 9, Conduit-street, W.

158. Patent Heat Regulator; C. Varley, 7, York-place, Kentish-town, N.W.

The object of this apparatus is to ensure any desired uniform temperature in ferneries, forcing-houses, greenhouses, or any chamber heated by gas. There is a tube to the upper end of which is attached a chamber, composed of a series of tubes, to increase its surface. The other end of the tube is bent into a U, and has a small chamber, with a stuffing-box attached to it; the lower portion of this tube is filled with mercury; the remaining portion of the longer limb of the tube and chamber is filled generally with spirits of wine; there is a smaller tube sliding through the stuffing-box into the larger tube, with a fluid joint, to allow of the motion of the smaller tube. The gas flows from the main through the small tube into the larger one, and out between the two tubes, and thence on to the burners which heat the chamber. As the temperature of the chamber rises, the fluid contained in the larger tube and in the chamber expands, raising

the mercury; and when it has raised it to a certain degree, the mercury closes the mouth of the smaller tube, and cuts off the gas. On the temperature falling, the mouth of the smaller tube is unclosed, and the gas turned on. A small burner, in direct connection with the main, is kept constantly burning, to re-light the gas when turned on, or it can be arranged that the flow of gas is only lessened, and never turned off. There is a graduated scale, over which an index attached to the small tube slides, and by sliding this tube up or down, the temperature is determined at which the gas shall be turned on and cut off. There is a modification of this apparatus, where, instead of sliding the small tube nearer or further from the surface of the mercury, the adjustment to the desired temperature is obtained by raising or lowering the mercury which forms the valve nearer or further from the mouth of this tube, by means of a plunger worked with a rack and pinion. By this arrangement all stuffing-boxes and moveable joints are avoided. The apparatus is made entirely of iron, and as there is nothing to get out of order, there is no possibility of derangement. Modifications of this apparatus are used to control the temperature of chambers heated by other means, and they are made of various sizes, according to the purpose for which they are applied.

159. Baker's Oven; Samuel Terrill, Redruth, Cornwall.

This oven is placed over the fire; between the fire and oven there is a brick slab, seven or eight inches thick, to protect the bottom of the oven from the fire. The flues have seven divisions—three on each side of the fire, which are under the oven, and one at the back. A second oven is placed over the first at the distance of several inches, which division forms a flue between the two ovens. This flue is divided on each side by a plate of iron, which carries the heated air between the upper surface of the first oven and the under surface of the dividing-plate; this air is then carried between the upper surface of the dividing-plate and the bottom of the second oven, then by the sides and over the top of the second oven. The two ovens and all the flues are governed by two dampers at the top; one of the dampers being near the front and the other near the back. By this invention it is stated that half of the coals usually required in the ordinary public ovens may be saved. There is no dirt produced in the oven; the cooking is done thoroughly, and with the saving of a considerable degree of labour. Whenever desired, the second oven may be dispensed with, without detracting in the least from the efficiency of the first.

160. Economic Stoves; Dressel & Levestamm, 463, New Oxford-street, W.

161. Patent Chimney Bar; Frederick Edwards and Son, 49, Great Marlborough-street, Regent-street, W.

This is intended to give a contracted form to the openings of chimnies, and renders a chimney more simple of construction. By giving a contracted opening to the chimney, it improves the draft and leaves no space for the lodgment of soot. The specimen shown has an improved register door attached to it, but this is not a part of the invention.

162. Ventilating Hearth-Plate; Frederick Edwards and Son.

This is intended to afford a supply of fresh air into rooms, and for preventing drafts. This plate is intended to occupy the place of the back stone hearth in fire-places. It is provided with a hollow chamber, into which a current of fresh air is introduced from an external wall. The air, passing under the warm hearth-plate, enters the room through the sliding ventilator under the fender. It thus insures a proper supply of air to a fire and prevents drafts from doors and windows. The ventilator can be closed whenever desired.

163. Patent Chimney Top; James Darrant and Noel A. Harris, 14, Little Howland-street, W.

The improvements in this chimney top are, firstly, that by a series of corrugated cells, it catches the wind and carries it in an upward direction, thereby causing a great current of air, which draws the smoke away with it; secondly, it is open at the top, thereby allowing the sweep's brush to pass through, while most tops are capped over; thirdly, by its construction, it entirely prevents all down-draughts; fourthly,

it can be readily fixed, as it requires no brickwork. The one shown in the engraving has a square bottom, for brickwork, which is only necessary where no earthenware pot has been previously fixed. Fifthly, it has no rotary motion.

164. Registered Perforated Chimney Pot; James Boyd, Hither-green, Lewisham, S.E.

This chimney-pot has perforations running in a spiral direction round it, so that (from whatever quarter the wind blows) it is stated by the inventor that an increased upward current is secured, and the possibility of down-draught overcome.

165. White's Patent Hydro-Fan; E. Weir, 142, High Holborn, W.C.

This apparatus is for the purpose of purifying, moving, and changing the temperature of air in enclosed places. The purpose is accomplished by forcing the air to be acted on into contact with water. In form A, of the hydrofan, this is effected by filling the lower part of the machine with water, and by turning the handle, which turns a fanner enclosed in a case, when the air will be drawn through the upper half of a perforated disc of metal, which is kept wet by revolution in the water, and will be forced out of the fan case. In form B, it is effected by the force of gravity of water turning a Barker's mill, on the arms of which a fanner is fixed, and by which fanner the air is drawn through perforated metal, over which the water from the Barker's mill is trickling. In form C, the force and action are similar to those of form B, but the force is obtained by filling the upper vessel with water by pumping it up from the lower.

166. Boy and Shell Metal Drinking Fountain, designed by John Bell; manufactured by the Coalbrookdale Iron Company, Coalbrookdale, Shropshire.

167. Marble Waterlily Drinking Fountain, designed by John Bell; Cheesewring Granite Company, 54, Old Broad-street, E.C.

168. Marble Victoria Regia Drinking Fountain, designed by John Bell; Cheesewring Granite Company.

These designs are also executed in granite.

169. Patent Glass Casks; Hubart and Cantillon, of Liège, Belgium. Exhibited by L. de Fontaine Moreau, 4, South-street, Finsbury, E.C.

These casks are blown in moulds.

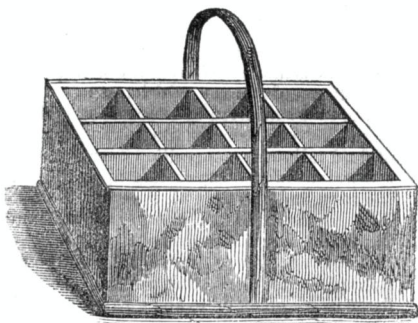
170. Patent Self-acting Valve for Preserving Empty Casks from Mould, by Excluding the Air; George Leslie, Upper Mall, Hammersmith, W.

This apparatus consists of three pieces of vulcanised india-rubber, with slits cut in their centres about two-thirds of their diameter. These pieces

are laid one behind another, the slits being placed at right angles with each other, and secured with a tinned iron, or an ebonite frame. The action is shown by thrusting the spigot affixed to the model through the top hole and valve; it is then open, and the contents could be drawn off. On the withdrawal of the spigot the valve closes. This can be applied to any other holes in casks.

171. Patent Packing Cases or Boxes for Holding Bottles, &c.; A. B. Seithen, 6, Alpha-place East, Caledonian-road, King's-cross, N.

This invention consists in the construction of baskets made of cork instead of cane or wicker,



for the transport of wine, &c., and plants which are breakable or likely to suffer from damp. In case of an accident or damage, these baskets can easily be repaired.

172. Improved Envelopes for Bottles; A. B. Seithen.



These improvements consist in leaving the necks of the bottles partly uncovered, and they take, consequently, less room. They prevent the shifting of the bottles, and thereby ensure greater safety in the transport.

173. Improved Manufacture of Cork Stoppers; A. B. Seithen.

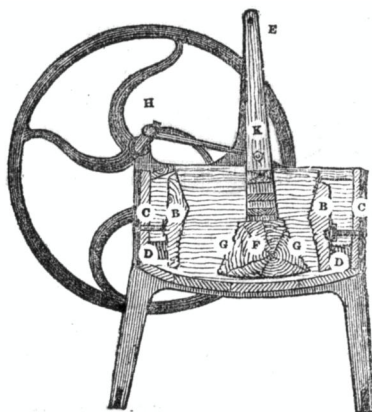
The novelty consists in that the corks, instead of being cut, are ground, which gives them any desirable shape, a much smoother surface, with less waste in the material.

174. Improved Artificial Corks; A. B. Seithen.

The corkwood is cut into fine veneers, and rolled up to the desired size, the end being cemented, thereby producing, from thin wood, large and stout stoppers, of an even elasticity and porous substance, while those cut by hand have a good and a bad side according to the different growth of the material employed.

175. Patent Washing Machine, combined with Wringing and Mangling Machine; W. Williamson, 133, High Holborn, W.C.

The mode of action is to form the linen, &c. into a roll, and to squeeze it against an elastic washboard (or against two elastic washboards in the double action machines), and at every stroke to cause the roll of linen, &c., to move round, so that its position is changed about fifty times per minute. The small machines are worked by lever motion; large machines by crank motion and flywheel.



176. Patent Washing Machine, (with Wringing, &c. combined); Thos. Bradford, Cathedral-steps, Manchester, and 62, Fleet-street, E.C.

This machine has an improved lid, or "Blueing Trough," by which an economy of time and labour is effected.

178. Universal Washing, Wringing, and Mangling Machine; Edward Weir, 142, High Holborn, W.C.

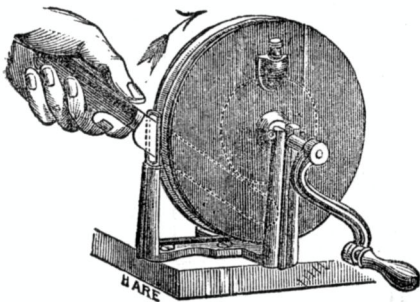


179. Saunders' Patent Cooking Range; Exhibited by Thomas Bradford, 62, Fleet-street.

In this range meat may be roasted before an open fire in the oven; for this purpose a sliding side nearest the fire-place draws out, and the fire radiates directly into the oven. Another feature of the range is, it is all encased and requires little fixing.

180. Patent Self-Adjusting Carpet Sweeper; Newton Wilson, and Co, 144, High Holborn, W.C.

181. Registered Knife Cleaner; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.



This machine consists of a pair of elastic revolving plates, supported by iron backs, working in a frame, and so arranged that the knives receive friction between them.

182. Patent Star Polish; Black Lead Company, 29, St. John-street, Clerkenwell, E.C.

This polish is intended for cleaning and polishing glass, plate, Britannia metal, &c.

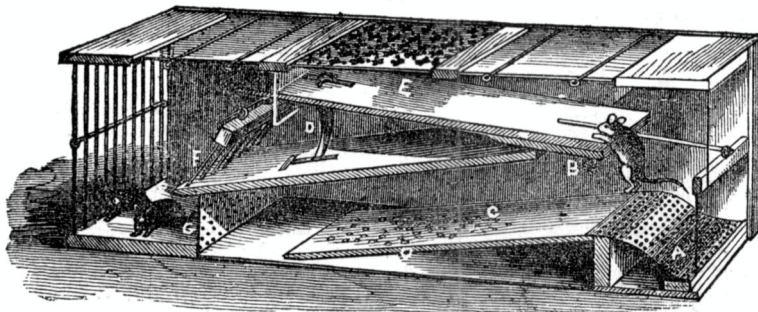
183. Improved Triangular Fire-Lighters and Revivers; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.

184. Steane and Palling's Patent Apparatus for Preventing Candles from Dropping or Guttering; Exhibited by John Gedge and Son, 11, Wellington-street, Strand, W.C.

This apparatus consists of a small metal tube with projecting arms, and a metal or porcelain cap. The tube is first passed over the wick of a candle, and afterwards the cap, which rests upon the arms of the tube supported by the candle; as the candle burns the tube becomes heated, and forms a well of fluid tallow or composition near the wick, and the weight of the cap resting upon the arms of the tube, it descends with it as the candle burns. The result is, that the outer circumference of the candle forms a border, over which the tallow will not run, even if the candle be moved rapidly from place to place, and the cap prevents the flame overlapping on to and guttering the candle.

185. Patent Double Cheval Glass; Brown and Co., Manor-place, Upper Holloway, N.

186. Colin Pullinger's Registered Automaton Mouse Trap; S. and E. Ransome and Co., 31, Essex-street, Strand, W.C.



The peculiar feature of this trap is that it is re-set by every mouse caught in it. The engraving represents a perspective view of the apparatus, the side being removed to exhibit the construction of the interior. A is a box covered with perforated zinc, and which contains seed. The mouse is supposed to smell this seed, but as he cannot get it, he endeavours to reach the bait B, which is a wire cylinder filled with lard. In doing so, he must step on the treadle C, and his weight overbalancing it, releases the trigger D from the catch, which throws the trap, and the

mouse is caught as represented in the engraving. As there is no escape at the entrance, the mouse climbs upon the balance board E, and being attracted to the opposite end by the zinc grating at the top, the balance board descends by his weight, which raises the door, connects the trigger D to the catch, and the trap is re-set. The animal, finding the opening through which it got on the balance board again closed, pushes its way to the chamber G, through the wire door F, which falls when he has passed, and finally secures him.

MISCELLANEA.

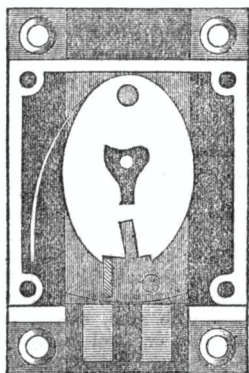
(For the remainder of the articles in this Section, see Drawings.)

200. Patent Fire, Gunpowder, and Thief-proof Safe; Chatwood and Dawes, Liver Safe Works, Bolton, Lancashire, and Ferrabee and Co., 75 and 76A, High Holborn, W.C.

This safe is constructed on the principle of the safety valve, so as to allow the gases of exploded gunpowder to escape without doing it the slightest injury. The peculiar arrangement necessary to carry out the patent is stated to render this safe much stronger than safes made in the ordinary way.

201. Double Patent "Ne Plus Ultra" Lock; George Price, Cleveland Safe Works, Wolverhampton.

This lock, as constructed for the doors of iron safes, is a lever lock, and the levers (six, seven, or eight, as the case may be) are of an oval shape, and have their centre of motion at the end, the same as in all ordinary lever and tumbler locks. The slot for the entrance of the "main stump" is at the other end, the same as in the "Ruxton lever." In the centre of the levers, "safety plate,"



and bolt, is formed the open space, and in this open space is placed the drill-pin, upon which the key performs one-third only of a revolution in locking or unlocking. The edges of the levers inside the open space are all in the same plane. The space around the "drill-pin" being thus enclosed, it follows that in the operation of locking or unlocking, this space must travel with the key, and, consequently, remains the same in area. From this circumstance, no second instrument or pick can be put into the lock, as if any one of the levers be moved, the keyhole is thereby closed against the admission of anything else. As there is not the slightest communication between this open space and the space outside the levers, no gunpowder can be forced, even by hammering it, into any other portion of the lock. The cavity for the reception of gunpowder being reduced to the smallest possible space for the reception of the

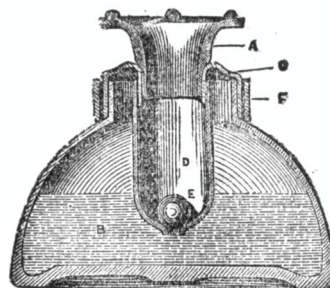
key and its action, and less than two dwts. being the most that can by any means be forced into it, added to the general strength of all the parts forming the complete lock, renders it capable of sustaining any number of explosions without the least liability to injury, except from the dirt left in the lock after each explosion. Between this and other lever and tumbler locks there is this difference, that whilst in the latter the levers can be pushed back by ramming the powder home, thereby considerably increasing the space for its reception, in this lock the cavity cannot be enlarged by any means whatever. The bolt is double-headed. The three apertures or channels in the head of the bolt serve the important purpose of letting out the gas, produced from the explosion of the gunpowder, into the large lock or bolt-chamber, so that in fact, the force of the discharge becomes altogether inoperative. There are also a number of holes in the bottom rim of the "lock-chamber" through which, again, the force loses itself.

202. Patent Secure Bullion Boxes; Job Mead and Co., Trolway Works, Bethnal-green, N.E.

These boxes are so constructed as not to be capable of being opened when once closed except by the entire destruction of them.

203. Patent Improved Inkstand; John Wilkins, 18, Essex-street, St. Peter's, Islington, N.

This invention has for its object the preservation of ink from dust and evaporation; a large and permanent supply in the reservoir; a facility of producing a supply for a day's use by the construction of a flexible circular hinge of vulcanised



India-rubber, so that the ink is forced upwards into a small reservoir or tube, and when required it is again forced back into the reservoir, and reserved for use in a clear, fluid condition. The neck of this flexible hinge is inverted, and a gutta-percha cup, A, is pressed into it; over this neck is forced a gutta-percha tube, D, which

forms a wide and air-tight joint, and in order to completely protect the ink, a gutta-percha ball, E, is introduced into the tube, which ascends and descends with the ink; and when the ink descends, the ball falls over the small aperture and excludes the air. B represents a glass ink reservoir, which may be of any size, and of any design, having a neck with an orifice of moderate diameter. The circular flexible hinge fits tightly round the neck of this reservoir, as shown by section C, thereby forming a perfect air-chamber. A metal ring surrounds the neck, as shown by section F. When the cup, A, is pressed downwards, the flexible hinge carries with it the small reservoir, D; the ink ascends, and the cup remains down as long as it may be required. When the cup is lifted upwards, the ink will descend, and is reserved for further use, in a clear and flowing condition. (See drawing, No. 259.)

204. Patent Ledger Indicator; John W. Wallis, 127, Fenchurch-street, E.C.

In this index the entire alphabet is always presented prominently before the eye, whether the book be closed or open; hence the labour of reference is lessened. It consists of a number of projecting tabs falling immediately opposite the letters required, which act as levers of reference, and protect the letters from being soiled. They are so constructed that the leaves do not tear and cannot curl up. It can be adapted to any book in use, at a trifling cost.

205. Patent Brief-Clip; Henry and William Earle, Hereford.

This clip consists of three fangs, cut from the centre of a triangular piece of metal, which fangs, turned up, form a stem; a hole is punched in the corner of the papers to be attached, the stem inserted, a small washer placed thereon, and the fangs turned back with the fingers. The triangular surface of the clip forms a good protection to the upper corner of the documents.

206. Patent Deed-Seal; Henry and William Earle.

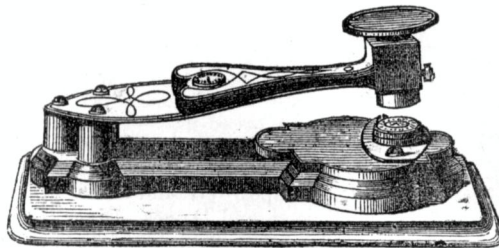
This seal for parchment documents, on the principle of the above clip, consists of a circular metallic rim, inclosing a green "ferret" disc, and is attached to the turn-up of the deed in the same manner as the "clip," but the washer is dispensed with. Either an adhesive wafer or wax seal may be used.

207. Specimens showing a New Method of Staining Designs on Leather, for Book-binding, Picture Frames, Upholstery, &c.; Charles Tuckett, jun., British Museum, W.C.

208. Patent Spring Lever Embossing Press; T. R. Pinches and Co., 27, Oxendon-street, and 14, Lisle-street, W.

This press is adapted for stamping both envelopes and note-paper, without removing the die. The chief improvement consists in its

having no hinge or pivot, and thus it cannot easily get out of repair, even by constant use.



209. Patent Perforated Newspapers; James Boyd, Hither-green, Lewisham, S.E.

The intention is to facilitate the separation of the pages of newspapers and other publications by an arrangement similar to that employed for postage-stamps.

210. Improved Selvage for Cloth; Charles Berck Hervé, Belgium.—Exhibited by L. de Fontaine Moreau, 4, South-street, Finsbury, E.C.

This invention consists in employing for the manufacture of the selvages of woollen and other fabrics a thread of cotton, flax, or other vegetable textile substance, combined with a thread of hair of any kind, and twisted together; or, in lieu thereof, a thread of cotton, flax, or other vegetable textile substance, with a thread of wool twisted with it. The selvage is made by the ordinary means.

211. Improvements in the Preparation of Stuffs in General; Julien Weerts, Verviers, Belgium.—Exhibited by L. de Fontaine Moreau.

These improvements relate to giving to stuffs or fabrics made wholly of wool, and partly of wool and partly of cotton, or partly of wool and partly of silk, and to fulled and milled cloths and woollen fabrics in general, more suppleness or pliability, and to make them more soft, clean, and bright in colour than hitherto, and consists in submitting the said fabrics to the action of a dressing machine, in which the dressing rollers are covered with sand, emery, powdered glass, or stone, iron or steel filings or any similar suitable polishing substance. The employment of this method of dressing produces on the cloth or fabric the effect of brushing as obtained by the brushing machine.

212. Arnold's Patent Machine-Made Ruffles or Frills; J. H. Johnson, 47, Lincoln's-Inn-Fields, W.C.; Wight and Co., Friday-street, E.C.

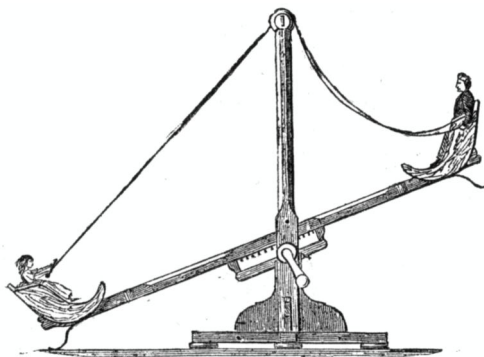
These Ruffles or Frills, intended for trimming ladies or children's garments, &c., are made entirely in a sewing machine, suitably adapted for the purpose. The gathered fabric is drawn up into plaits or gathers and stitched on to the plain band or fabric at one operation, the same series of stitches sewing both to hold the gathers together, and unite them to the band. For description of the mechanism employed, see *Practical Mechanics' Journal*, vol. 5, New Series, page 198.

213. Patent Plastic Leather; R. Seager and Co., Ipswich.

This is a compound of leather, india-rubber, and gutta-percha. Leather shreads are submitted to an alkaline solution under gentle heat, until reduced to a fibrous condition; they are then rubbed through a wire cylinder; the fibre so obtained is then placed in a masticator with gutta-percha, india-rubber, or a mixture of both, the proportions being according to the texture of the material required; if pliable, more india-rubber; if hard, more leather; the pliable material is adapted for shoe bottoms, being damp-proof, and stated to be more durable, and less expensive than common leather. That which is hard and rigid is adapted for picture frames, and other ornamental designs, either plain, bronzed, or gilt, as shown by the specimens exhibited; its colour may be so blended as to resemble wood carvings.

214. Boots with moulded bottoms of Plastic Leather; R. Seager and Co.**215. Boots moulded with Gutta Percha bottoms R. Seager and Co.**

These boots are moulded on the uppers without being stitched, by R. Seager and Co.'s patent shoe clamps.

216. Patent Fancy Hair Brushes; Richard John Cole, 11, Pembridge-gardens, Bayswater, W.**217. Patent Gymnastic Invigorator, or See-Saw; Martin Deavin, 28, Crystal-terrace, Rotherhithe, S.E.**

This invention consists in adjusting the ordinary see-saw on its fulcrum, by means of racks and pinions, so as to equalise the various weights of

children, who work it themselves by means of cords attached to the perpendicular central stand. It has secure seats at either end.

218. Patent Email Letters and Ornaments; C. A. Schneider, 31, Queen's-square, Bloomsbury, W.C.

These letters, &c., are manufactured of a composition of waterproof materials, rendered unalterable by chemical processes. They have the advantage of combining, with a brilliant appearance by day, a perfect transparency by night.

219. Safety Medicine Bottles; William Toogood, 37, Mount-street, Grosvenor-square, W.

These bottles are made with contracted necks, so as to allow the fluid to flow in drops; some of



them have their necks ground in and moveable for filling, others have an opening at the bottom, for filling, which is closed by a cork, while others are made of dark coloured glass, with fluted sides.

220. Patent Seltzine Apparatus for Facilitating the Manufacture of Soda, Seltzer, or other Gaseous Waters; James Boyd, Hither-green, Lewisham, S.E.**221. Self-acting Sieve, for the Use of Cooks, Bakers, Grocers, &c.; George Warriner, 38, Finsbury-square, E.C.**

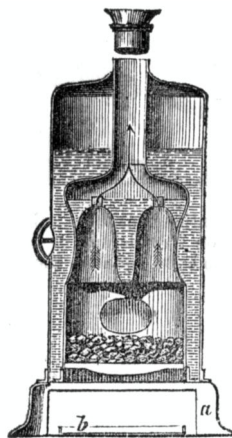
DRAWINGS.

230. Patent Improved Steam, Water, and other Fluid Gauges; Pullan and Creswell, Surrey Iron Works, Blackfriars, S.

Figs. 1 and 2 represent the improved double flat glass water gauge, the back glass acting as reflector, with self-cleansing cock at the bottom, and screw valve at the top. Figs. 3 and 4 show flat glass universal water gauge, and the improved mode of shutting off the steam, and all communication with the boiler, by one movement, and also for blowing the gauge through for testing whether it is in working order. This also has a reflector in the back for showing the height of water in the gauge. Figs 5 and 6 show the double reflecting flat glass water gauge, with the improved double-coned screwed valve, for shutting off the steam and testing the gauge and screw valve at the top. Fig. 7 shows an improved double flat glass reflecting water-gauge, arranged as a duplex gauge, so that at any time one gauge can be tested against the other to see whether they work accurately or no; and in case of accident to one it can be shut off, and the other used until it is repaired, with the improved screw valves at the top and bottom, as before described. Figs. 8 and 9 show the improved flat glass reflecting water-gauge, showing three gauges, one behind the other, and each glass acting as reflector for the front one, the object in this gauge being, in case of accident to the front one, the valves at the top and bottom can be shut off, so that the height of water can be seen in the second glass, and so on to any number. Figs. 10 and 12 show an improved flat glass gauge. The glasses in this instance are arranged in four circular pieces, in place of one long glass, and there is also an improved mode of packing the glasses on the edge by ordinary packing with a screw or gland stuffing-box, which will be clearly understood by sectional drawing (Fig. 12). Figs. 11 and 13 show square glasses in place of round ones (as described). Figs. 14 and 15 represent an improved flat glass universal water-gauge, arranged in a circular frame, to be packed on the edge of the glass with ordinary packing, instead of the joints being made with red lead or india rubber; and also an improved mode of shutting off all communications with the boiler by one external movement. Fig. 16 shows an improved circular glass reflecting water-gauge, with an improved pressure and thermometer combined; that is to say, it will indicate height of water, pressure of steam, and temperature of steam, and also an improved mode of shutting off all communications (as before stated). Fig. 17, shows an improved flat glass water gauge, combined with pressure and brine gauge, and low water alarm whistle. Fig. 18 shows an improved flat glass water-gauge combined with low-water alarm whistle and frictionless water-gauge; that is to say, if any accident occurs to the front glass, the communication between the boiler and glass can be shut off, and the weight of the water will be shown by the index inside the gauge. Fig. 19 shows in section an improved reflecting flat glass water-

gauge, and instead of the glass being put in in two flat pieces, it is one solid piece of glass with a slot or hole down the middle; this form of gauge avoids all making of joints; there is a slight frame placed round it to protect it from accident. Fig. 20 shows in section a flat glass water-gauge, and mode of putting packing round the edges of the glass, instead of the joints being made on the top of the glass; the piece shown in the middle is separate from the body of the gauge, and also serves as a gland for packing the two glasses. Fig. 21 shows in section another mode of putting an improved flat glass water-gauge together, being packed on the edge of the glass, which is found the best in practice, there being no oxidation from the red lead in the water-space between the glasses. Fig. 22 shows the improved tubular glass water-gauge, for shutting off all communication with the boiler by one movement. Figs. 23 and 24 show an improved flat glass water-gauge applied to the front of an ordinary tubular gauge, so that they can work with the flat or round glass. It can also be used on any water gauge in use at present. The flat-glass gauge can be used in place of the round tube between the stuffing boxes, if preferred, being on the front, the advantage being, that by its being on the front, you get a much longer range of water, and it will show the lowest water line to the crown of fire-box, which cannot be seen in ordinary gauges on account of the depth of the stuffing boxes. Figs. 25 and 26 show an improved flat glass water gauge, fitted with patent enamelled reflector, applied direct into the front of the boiler, with screw valves at top and bottom. (See specimens No. 12).

231. Patent Steam Boiler and Super-heating Apparatus; Pullan, Cresswell and Longstaff.—Exhibited by Thomas Cresswell, Surrey Iron Works, Blackfriars-road, S.



By this drawing a vertical boiler is shown, having a transverse chamber extending from water space

to water space across the fire-box, and having within it cones which project upward from the fire, and connected with the upper portion of the fire-box by means of hollow stays, whereby a free circulation of heat is obtained. The improved form of superheating is shown applied to a locomotive boiler wherein a series of tubes are employed, which pass through the main tubes of the boiler, and through which the steam is led on its passage to the cylinders, thereby being brought into contact with the heated products of combustion, previous to their escape into the atmosphere. An enlarged view of these tubes is given, showing different modes of connecting them. This form of superheater is shown fitted in the upper part of the fire-box of a portable engine. The series of tubes in this may be so arranged as to cause the heated gases, or steam, to travel over the fire as many times as may be found advantageous in practice. Another arrangement is shown applied to a stationary or marine boiler, in which a horizontal longitudinal chamber is placed above the boiler, its interior being placed in direct communication with the steam of the same by means of suitable tubes. Spaces are formed at each end of the chamber by means of partitions, the one space being open to the fire-box and the other to the smoke-box of the boilers. Communication is also made from space to space by means of a series of tubes passing through the body of the chamber. The heated gases from the fire-box passing through these tubes, will dry or superheat the steam which issues into the chamber from the boiler. The amount of heat imparted to the steam may be regulated by means of dampers placed between the fire-box, smoke-box, and chamber already described.

232. Patent Rotary Steam Engine; R. A. and M. Jefferson, 30, North-street, St. John's Wood, N.W.

(See Model, No. 21.)

233. Rails and Railways; H. L. Corlett, A.C.E., Inchicore, Dublin.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

This drawing illustrates various novel forms of cast iron chairs with wedge and screw fastenings, especially adapted to the securing of the rail ends, also improved forms of rails, whereby the use of sleepers, chairs, and fish plates, is rendered unnecessary, whilst, at the same time, the bearing surface or tread is increased and made to correspond to the conical form of the peripheries of the wheels, and the point of support is elevated to as near the top of the rail as is practicable, so as to secure a continuous and level surface, combined with durability of structure and facility for executing repairs.

234. Patent Steam Engine Governor; William Leatham, Brookfield Works, Leeds.

(See Model, No. 15.)

235. Patent Key for Securing Rails; James Morris, 5, Albert-square, Clapham-rd., S.

In the drawing, fig. 1 shows a transverse section of a railway chair of an ordinary construction, having a rail secured or fastened therein by a key or wedge according to this invention. The form however of the key or wedge will require

to be varied when the interior of the jaw of the chair or the section of the rail differs from what is shown in the drawing. Fig. 2 shows a front view of the key or wedge made according to this invention, and fig. 3 an end view thereof. The key or wedge is cast or formed with its inner surface to come next the rail, and with its outer surface to come next the interior of the jaw of the chair and the rail. The surfaces of the key correspond in general contour or outline with the surfaces of the rail and the jaw of the chair, but not so as to fit tightly. The key or wedge is of metal, and is cast or formed with a recess in it, to receive a piece of dry wood in such manner as to protrude beyond the metal surface of the key or wedge, so as to cause the metal key or wedge (which, without the wood, is, as above stated, formed to fit easily between the rail and the jaw of the chair), to fit tightly and require to be driven in between them with force. (See Model No. 30.)

236. Drum Traction Engine; J. and R. Blackburn, Long Eaton, Derby.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

In this traction engine a large drum or cylinder is used, which acts as a supporting and driving wheel to the engine, by which arrangement a larger traction and supporting surface is obtained, and the adhesive power is increased, whilst the injury to the road is materially diminished.

237. Patent Machine for Breaking up Roads; James Braby, jun., 32a, Newington-causeway, S.E.

(See Model, No. 123.)

238. Patent Improved Steam Boilers; John Redfern, 33, Cumberland-road, Southsea.

(See Model, No. 5.)

239. Patent Metallic Clamps to Close Rents, &c., in Fire Engine Hose; R. Dawbarn, Wisbech.

(See Model, No. 19.)

240. Hydraulic Steam Hammer and Hydraulic Anvil; Imray and Copeland, 65, Bridge-road, Lambeth, S.

The principal features of this hammer consist in—1. The arrangement of the steam valves, slides, and ports for working the steam at full pressure for the up-stroke, and either expansively or at full pressure for the down-stroke, and for cushioning the piston on its passing the ports, by means of the compressed steam retained beyond them. The steam pipe communicates with the slide by two valves; when the lower valve only is opened, steam enters the lower part of the cylinder, and acting on the annular surface of the piston, raises the piston-rod and striker, and the same steam, on turning the slide, expands into the upper part of the cylinder, where it acts, with the reduced pressure due to its expansion, in propelling the piston-rod and striker downwards. But when the upper steam valve is also opened, fresh steam from the boiler enters the upper part of the cylinder, where it acts with its full pressure, and propels the piston-rod and striker downwards, with proportionally great

force. The ports by which the steam escapes after acting on the piston, are placed at some distance from either end of the cylinder, and the piston before reaching either end of its stroke covers the exit ports, and thus retains a portion of the steam, which, becoming compressed by the advance of the piston, acts as an elastic cushion to save it from striking the end of the cylinder, and to start it like a spring for its next stroke. The slide itself is circular in section, and made slightly conical, to secure accuracy of fit in its case, and it is worked by a simple hand-lever. The arc through which the lever is moved by hand, and the time during which the workman permits it to dwell at the extremities of its vibration, regulate the speed and intensities of the strokes; and it is practically found that a little experience in working the lever enables the workman to regulate the strokes with the greatest delicacy.

2. The construction of the striker as a cup, containing oil, which forms a liquid cushion, and saves the piston-rod from upsetting, and the piston from damage by the blow. In many hammers where the weight of the piston and rod forms an essential part of the striking mass, it is necessary to have recourse to cast-steel piston rods, and very strongly made and even solid pistons, in order to avoid the upsetting of a soft rod, and the breakage of the pieces which constitute the piston. But in the hydraulic hammer it is said that the oil cushion which is interposed between the actual striker and end of the piston rod, renders all such precautions entirely unnecessary. A soft iron piston rod and a cast iron piston can thus be used without danger of upsetting or breakage, and, at the same time, the quality of the blow is not deteriorated, for the oil is really less readily compressible than the solid metal, or, in other words, the compression takes a longer period to pass through the liquid, so that at the instant of delivering the stroke, the whole mass acts with undiminished force, as great as, if not more than it would be, were there a solid metallic connection throughout. The ring which retains the collar of the piston rod within the cup of the striker, is made with internal cavities to catch such portions of the oil as may be spurted up at the instant of the stroke, and when the piston ascends with the weight of the striker hanging from it, the pressure of the air forces the oil back into the cup to be ready for the next blow.

3. The arrangement of the anvil on the ram of a hydraulic cylinder connected with a cistern about 15 feet high, and fitted with an ingress and an egress valve, so that the anvil can be raised or lowered to suit the tools or work placed on it. The blow is thus received on a liquid base, which changes the concussion into a diffused fluid pressure, and saves the hammer and foundations from the destructive effects of the shocks which in other hammers are transmitted through solid materials. Practically, the hydraulic anvil, without at all diminishing the sharpness and efficacy of the blow, renders expensive foundations altogether unnecessary. The actual pressure shewn on a gauge applied to the cylinder at the time of the stroke, does not exceed 60 or 70 lbs. per square inch, which is a strain so moderate on the cylinder and its base, that no damage can result from its constant repetition. As the ram is made of considerable area (practically about the size of the steam cylinder), no great head of water is necessary for raising it. A cistern raised 12 or 15 feet from the ground, gives

sufficient pressure to raise the anvil some inches in a few seconds, and on opening the egress valve, the anvil sinks down with considerable rapidity; thus even during a heat the altitude of the anvil block can be increased or diminished at pleasure, so as to suit the depth of the work and tools that may be placed on it. As in the case of the oil cushion in the striker, so with the hydraulic anvil, the small and slow compressibility of the liquid gives a similar sharpness and resiliency to the blow, which more resembles that given by a sledge hammer worked by hand, than it does the stroke of a dead weight falling by gravity or propelled by pressure.

4. Simplicity of general construction and of action, and consequent economy of manufacture and fixing, facility of working, durability and security against derangement and wear.

241. Steam Hammers; R. Morrison, Ouseburn Engine Works, Newcastle-on-Tyne.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

These views illustrate Mr. Morrison's most recent improvements in steam hammers for forging puddled balls or "blooms," and for smithy and general work. One great peculiarity in all these hammers is the heavy hammer bar which forms the piston rod of the cylinder. The piston is forged in one piece, with the hammer bar or rod near its longitudinal centre, and the upper portion of the hammer bar passes out through a deep stuffing box, formed on the top cover of the cylinder, which serves as a tubular guide for that portion of the bar extending out beyond the stuffing-box. The slide valves are worked by a slotted segmental link and roller, the latter carried by the top end of the hammer bar, and working along the slot of the link. In the puddling hammer, the opening between the standards is of a gothic form, and the cylinder is bolted between the standards, in a line therewith, but in the hammers for general purposes the standards are made to overhang their lever considerably, and the cylinder is bolted at the overhanging portion, so as to stand out clear beyond the front of the framing.

242. Direct Acting Gas Exhauster; George Anderson, 104, Leadenhall-street, E.C.

This consists of a double-acting pump, which receives and delivers the gas at each end alternately. The two figures to the right of the drawing represent the steam-engine and the exhauster connected to opposite ends of the same crank shaft. This arrangement dispenses with all intermediate gearing, and is economical in its construction. The radii of the exhauster crank can be altered to suit the quantity of gas made, or a larger cylinder may be placed in the same spot, the length of spoke and centre distances being uniform to admit of this.

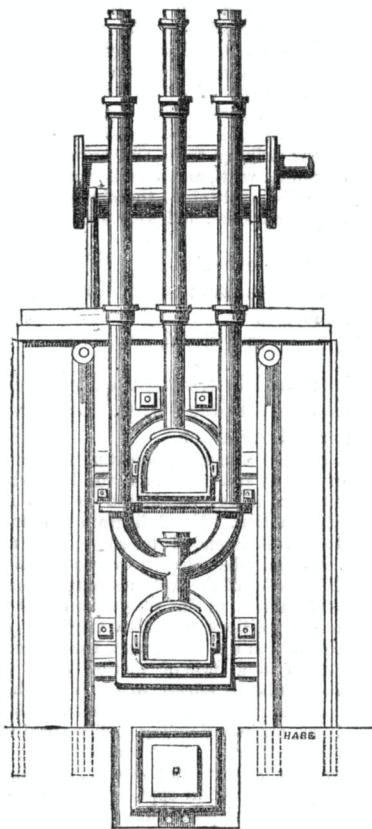
243. Patent Retort Settings for Gas Works; George Anderson.

The peculiarities of this mode of setting are, instead of having a furnace to each oven of retorts there are three ovens heated by two fires. The three centre ovens of the drawing represent what is technically called a "triplicate," two of which are set with fire-clay retorts, and a furnace each. After the heat has circulated through these two ovens, it is caused to pass into the

centre oven, where it heats ten iron retorts. The furnaces may either be constructed to consume coke or tar. The tarfire-place is of a peculiar construction, consisting of an inclined plane of brickwork, down which the tar trickles, and by thus presenting much surface, and by the introduction of hot air through the ash-pit, which, in this case, is fitted with a door, a smokeless combustion is obtained. The two settings of retorts, forming the extreme right and left of the drawing, represent another mode in which nine retorts are heated by one fire. The drawing represents a range of retorts, erected for Mr. E. Goddard, of the Gas Works, Ipswich.

244. Patent Vertical Oven Gas Retort; William Richardson, Engineer, Dudley.

This retort may be constructed either in iron or clay. The method of working it (after it is heated to the required temperature), consists in first charging the requisite quantity of coal through the lower mouth-piece, and when the first charge is worked off, putting the next charge of coal through the upper mouth-piece upon the heated coke of the previous charge; and, if necessary, the third or fourth charge of coal can be put through the upper mouth-piece



upon the coke of the previous charge. The difference in the dip of the pipes in the hydraulic main will compel the gas, as it is evolved from the coal, to descend through the hot coke of the previous charge, whereby more gas is produced

with less tar and ammoniacal liquor, and the coke becomes more firm and fixed, and is consequently better suited for general purposes. As this retort will require to be drawn only once in twelve or twenty-four hours, a saving of labour will be effected.

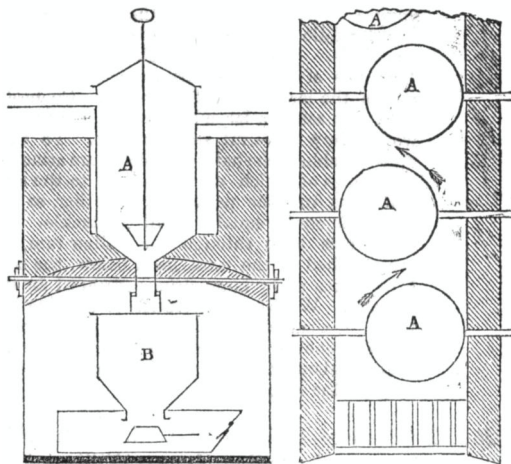
245. Patent Gas Retort Bed; George Walcott, 24, Abchurch-lane, E.C.

(See Model, No. 34.)

246. Gas-holder, erected at the South Lambeth Distillery; J. T. B. Porter and Co., Gas Engineers, Lincoln.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

This is exhibited more as an example of the adaptation of highly ornamental designs to ordinary utilitarian purposes than of any recent improvements in this class of apparatus. The tank, pillars and girders are all highly decorated. The tank is formed of cast-iron plates, its edge being terminated by a battlemented or castellated cornice, and at either side provided with spouts and heads of the same character to carry off the waste water, thus preventing any overflow on the tank sides during rain or otherwise. The tank is ten feet deep, and sunk into the ground four feet, resting upon a bed of concrete one foot in thickness; outside the tank rise three piers of solid masonry, capped with stone bases for the pillars to rest upon. Each pillar is square in plan and formed of open tracery in four stages, with bold ornamental bases and quatre-foiled caps, on each side of which are embossed shields bearing the insignia of the proprietor, and each is surmounted by a *fleur de lis*. The connecting beams or girders are formed of open trefoils capped by an ornamental cresting of flowers and cusps, the angles being filled with traceried brackets.

247. Patented Improvements in the Manufacture of Salt; Charles Greenway, 4, Albert-place, Cheltenham.



The following are the references to the drawing:—A, boilers for engine; B, receiver for salt. The object of this invention is, 1st, to make use of the steam generated in evaporating brine

for the evaporation of other brine; 2nd, to save coal by a more direct application of the heat to the brine; 3rd, to save labour in withdrawing the salt; and, 4th, to reduce the wear and tear to a minimum.

248. Patent Collapsing Swan Paddles; Daniel Baldock Lewis, 98, High-street, Cheltenham.

These paddles are intended to be worked with a crank and connecting rod on trams or slides attached to the sides of the vessel, the stroke being horizontal and beneath the surface of the water. The paddles consist of two flaps secured by a pin running through a rule joint, so that they can be easily separated and repaired.

249. Improved Eccentric Propeller; W. H. Crispin, Stratford, E.
(See Model, No. 71.)

250. War Ships Safety Ports; George Ellis, 4, Collier-street, N.

This arrangement of ports is intended to reduce the space open to assault from 30 to 50 per cent. without diminishing the room requisite for the efficient operation of the guns. The straight lines show the forms and dimensions of the ordinary port.

251. Salvage Steam Ship; Captain Copping, Londonderry, and John Weild, Glasgow.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

The object of this ship is to save shipwrecked property. The vessel is what is usually termed a "twin," being composed of two hulls of unequal size, placed at some distance apart, and connected together by transverse and vertical "lattice girders," which project above and extend over both decks, the whole being covered with a deck on the same level, making them as rigid as one vessel. Both hulls are divided into a number of water-tight compartments. The propelling power is derived from a pair of oscillating engines connected directly to the shaft of a single broad paddle wheel placed in the space between the hulls. The lifting machinery consists of four sets of double shears arranged along the side of the larger hull of the vessel. Connected with each set is a large hydrostatic ram or press, worked by a powerful steam-engine. To these rams suitable pitch chains and blocks are attached, the pumps of which are connected to the same main pipe from the pumps when lifting, so that the strain comes equally on all the tackle. The chains pass down through the hollow ram, and are attached to the cross head below, the slack being taken up by large drums arranged for that purpose. Whilst the operation of hoisting is in progress, a sufficient quantity of water is pumped into the compartments of the smaller vessel, to counterbalance the weight lifted by the machinery on the larger one.

252. Patent Economic Front-Ignition Cartridge for Breech-loading Guns; William Sear, Wolverton, Bucks.

This cartridge has a metal end, readily attaching and detaching from the paper tubes or cases; being turned in a lathe great accuracy is ob-

tained in fitting the gun. The recoil is also diminished, and the charge being ignited in front, prevents any portion of the powder being blown from the barrel unconsumed.

253. Patent Breech-Loading Fire-arms; Thos. Shedden, 4, Maitland-street, Edinburgh.
The drawing shows the invention applied to a common musket-barrel.

254. Rifle and Projectile; John Scott, 23, Michael's-place, Brompton, S.W.

255. Patent Stereotrope or Stereoscopic Thaumatrope; W. T. Shaw, 110, Bunhill-row, E.C.

(See Specimen, No. 99.)

256. Turret Clock; John Bailey and Co., Albion Works, Salford, Manchester.—Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

This represents a turret-clock, constructed by the above firm for All Soul's Church, Halifax. The hour is indicated upon two dials, 8 feet 6 inches in diameter, and the arbor carriers are attached to the frame by bolts and steel steady pieces, so that any single wheel may be removed at pleasure without disturbing the frame. The clock is provided with patent wire ropes, and has a set dial to set the hands by maintaining power. A compensating pendulum is used 150.55 inches long, the bob of which weighs two cwt. The pendulum springs are made short in order to enable the point of suspension to be well defined. In the striking train the ordinary pin-wheel is dispensed with, and a snail motion with friction roller is substituted, thereby reducing considerably the friction and wear and tear of the parts.

257. Patent Cloth-Padded Wood Strips for Windows, &c.; John Brown, Architect, Norwich.

(See Model, No. 149.)

258. Diagrams Illustrating the Principles of Motion and Force; J. C. Bowler, Bowden, near Manchester.

No. 1 is a diagram, indicating the first principles of motion and power, and the laws which govern material things, considered as in a state of rest or in motion. No. 2 diagram is founded on No. 1, and is intended to show that motion and power may be obtained by two opposing weights. The power of the weights acting upon the levers is calculated on the supposition that (in the different positions in which they are represented) they are in a state of rest, the power or force of bodies in a state of motion being different in its results or effects to the same bodies when considered as in a state of rest. No. 3 diagram is an outline drawing, being an illustration of diagram No. 1, and is a continuation of diagram No. 2, showing how the principle of unity or oneness of purpose in opposing forces may be made available and practicable to every-day purposes, the motive power (as a suspended weight, pressure, &c.) being fixed or stationary.

259. Patent Improved Inkstand; John Wilkins, 18, Essex-street, St. Peter's, Islington, N.
(See Specimen, No. 203.)

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